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## Oral Health Promotion

Jussila Aino-Liisa, Oinonen Meeri (toim.)

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#### CONCLUSIONS

Nowadays health promotion plays an important role in health care ideology and implementation. Individuals' commitments and decisions relate to their health and wellbeing. The general awareness of healthiness has positive impacts also on young people's wellbeing. Dental professionals, in particular dental hygienists are in the important role when promoting oral health for adolescents. That is why the preventive aspect of dental hygienists' work is one of the key contents of their education.

### INTRODUCTION

Nowadays health promotion plays an important role in health care ideology and implementation. It's vital to commit individuals to take action with the decisions that concern or have impact on their health and wellbeing. Overall, wellbeing has been on display in publicity and media for several years and therefore people are already quite aware of its' meaning and they are ready to make efforts to achieve and maintain health.

This general awareness has positive impacts also on young people's wellbeing. Healthy behavior and habits are more easy to adopt as a child or teenager than later on. We need to have an easy access to information, which

is suitable for children and teenagers to their health and functionality. Children and teenagers need to be motivated and encouraged to work for their general wellbeing. Dental professionals, in particular dental hygienists are in the important role when promoting oral health for adolescents.

Dental hygiene students' ability to oral health promotion was practiced during the Health Promotion Project course by doing literature searches, writing essays and having presentations and peer evaluations. Wide area of young people's oral health promotion was defined as importance of self-care, motivation as a tool for dental hygiene, xylitol and its benefits on oral health, nutritional challenges and their effects on oral health, and effects of smoking and nicotine products on oral health. The project event was carried out in Oulu International School in March 2019 and it was part of the 9th grade pupils' health education.

The preventive aspect in dental hygienists' work can be seen as an entity in this health promotion project, including planning and collaboration, implementation and evaluation as well as documentation in the form of this publication.

Oulu, 14th June 2019

Aino-Liisa Jussila and Meeri Oinonen



## The Role of Dental Hygienist in Oral Health Promotion in Finland

Oinonen Meeri

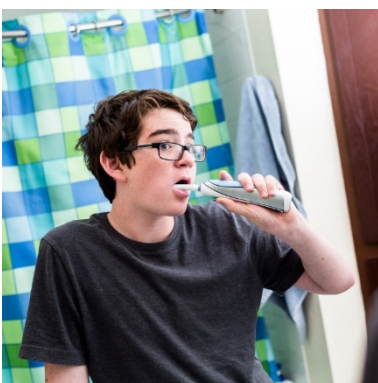
Term oral health may have variable meaning for different people. Quite often a thought of healthy, functional and approvable teeth comes to mind, but actually oral health is much more. It is a question of individual's general wellbeing, functionality and overall health. Poor oral hygiene has negative effect on oral health. Oral health has a strong socio-behavioral and environmental basis and the significance of oral hygiene in biofilm control is a well-known and recognized fact.



## Importance of Oral Self-Care

Elgbacka Suvi, Erola Ella-Liisa, Haikala Iida, Keskitalo Rosa, Manninen Hanne, Penttilä Jenna, Jussila Aino-Liisa

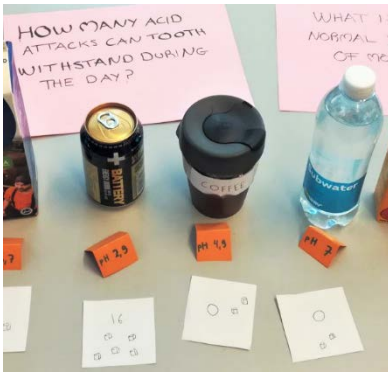
Tooth brushing is relevant for promoting good dental and oral health. Periodontal diseases are quite common among young adults and they also have bigger need for periodontal treatment than for caries treatments. Gingivitis is a sign of poor oral hygiene and it can progress to periodontitis. Caries and periodontal diseases can be avoided by brushing teeth twice a day and cleaning tooth caps once a day.



## Motivation as a Tool for Dental Hygiene

Heiskanen Jake, Palo Johanna, Outila Iida, Vuorma Mari, Jussila Aino-Liisa

Dental hygienist students of Oulu University of Applied Sciences (OUAS) are arranging an event in the International School in Oulu for the 7th graders. Aim of the event is to teach the youth important facts about dental health. Brushing teeth regularly twice a day, avoiding snacks, drinking water instead of juices and soft drinks, and having xylitol after every meal are the best ways of treating your dental health.



## Oral Health Promotion for Young People

Huhtala Merja, Paasovaara Jonna, Previ Marlene, Riskilä Kreetta, Tikkanen Rinna, Jussila Aino-Liisa

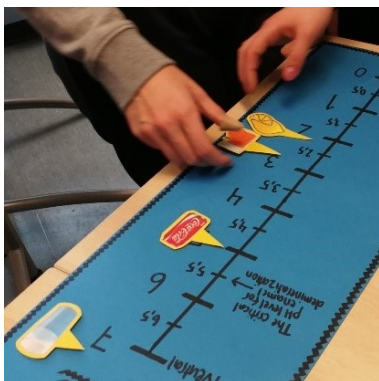
This article contains health promotional material about drinks that includes the following subjects: what are the pH-values of different drinks, how much sugar do different drinks contain and why is it important not to drink sweetened drinks along the day. The aim of this article is to provide new information about these matters to knowledge the risks and decrease the usage of sweetened drinks along the day.



## Xylitol and its Benefits on Oral Health

Boricheva Ekaterina, Elsilä Saara, Häkkinen Eveliina, Karjalainen Laura, Kinnunen Elina, Laapotti Laura, Ballardin Lisa, Jussila Aino-Liisa

Xylitol is a product found from plants and it can prevent tooth decay. Using chewing gum or pastilles that contain xylitol after every meal is an easy way to stop acid attack and help your teeth to remain healthy.



## Nutritional Challenges and their Effects in Oral Health among Ninth-Graders

Tasala Laura, Paso Jaana, Lautamo Elina, Ervasti Katja, Kaisto Salla, Iinatti Sanna-Mari, Jussila Aino-Liisa

Tooth erosion and dental caries prevalence in the younger population have raised concern in the dental community. The main reasons for erosion and caries are poor oral hygiene and consumption of carbonated drinks and acidic sweets and snacks. Informing adolescents of these harmful dietary habits is important in promotion of good oral health.



## Effects of Smoking and Nicotine Products on Oral Health

Cozzio Marta, Heikkinen Roosa, Kesti Minna, Lepola Saana, Määttä Jonna, Poikajarvi Laura-Kaisa, Ristaniemi Heli, Jussila Aino-Liisa

Smoking is one of the most significant risk factor in many diseases. That's why prohibiting the beginning of smoking and encouraging quitting is very effective way to boost general health. Youngsters are especially vulnerable to start smoking and by targeting adolescents for anti-smoking information, smoking in the future will decrease nationwide.

## CONCLUSIONS

Jussila Aino-Liisa, Oinonen Meeri

Adequate literature searching skills and creative collaboration skills inside and between the study groups were needed to product the different phases of the event of oral health promotion. Writing the essays for this publication in English was also one of the objectives of the studies, which consequently deepened the students' professional knowledge. Working together with Italian exchange students offered a great opportunity for internationalization.

Internationalization is one of the most important issues of current interest, also in the studies of students of dental hygiene. At the moment all the students of Oulu University of Applied Sciences have 30 ECTS of their studies in foreign language. In the degree program of dental hygiene, Finnish students have a great opportunity to learn more about studies and profession of an Italian dental hygienist as they study e.g. health promotion or perform practical training in our dental clinic together with Italian exchange students. Correspondingly incoming exchange students learn about Finnish system. Finnish students don't necessarily need to travel abroad in order to get internationalized. They have a chance for it here, at their own campus in Finland.

This kind of project is a motivating and inspiring way for students of dental hygiene to learn more about the health promotion for children and adolescents. It has also given a new perspective for the teachers – this has been a small experiment of shared or team teaching with the areas of different expertise. We have had a great chance to work together in a new way, that we'll hopefully continue and develop in the future.

# The Role of Dental Hygienist in Oral Health Promotion in Finland

Oinonen Meeri

28.6.2019 ::

Term oral health may have variable meaning for different people. Quite often a thought of healthy, functional and approvable teeth comes to mind, but actually oral health is much more. It is a question of individual's general wellbeing, functionality and overall health. Poor oral hygiene has negative effect on oral health. Oral health has a strong socio-behavioral and environmental basis and the significance of oral hygiene in biofilm control is a well-known and recognized fact. Dental biofilm, the complex community of oral bacteria, may cause diseases in teeth and the supporting tissues. However, it's possible to prevent these diseases in active co-operation with patient, dental professionals and surrounding community. Within patient's interdisciplinary care dental hygienists have a significant role in counselling oral hygiene, promoting health and preventing diseases.

## Introduction

Oral diseases are common, globally existing health problems with significant social and economic influence. One of the most typical oral diseases is dental caries, harmful decay of the tooth tissue. Caries is primarily caused by cariogenic microbes together with unhealthy diet and poor oral hygiene. Individually dealt caries may cause discomfort, pain and malfunction, in other words have negative effects on the person's quality of life or even cause to death. Oral disease may lead to lack of the teeth and thus cause mastication or nutritional problems. It may also have potential negative effects on person's emotional and social wellbeing – a person with poor oral health may back out of social interaction because of damaged or missing teeth or having foul-smelling breath, halitosis. There are also many people that avoid seeing their dentist because of anxiety, fear or even fobia of dental treatment.

## Relation between oral and general health

All dental professionals should encourage people to take good care of their oral health as well as increase public awareness and knowledge of the meaning of proper oral health. Oral health is important for person's overall health. There's been a lot of research and numerous studies or surveys have shown us e.g. the strong relation between periodontal diseases (e.g. gingivitis; infection of gingiva and especially periodontitis; disease affecting the tissues that surround and support teeth) and systemic diseases e.g. cardiovascular diseases, diabetes, asthma and rheumatic disorders.

Untreated or chronic periodontitis has negative effects on the adequate balance of diabetes or heart disease or it may weaken the prognosis of systemic disease <sup>[1]</sup>. Elevated CRP (the plasma C-reactive protein) is a risk factor for cardiovascular diseases and CRP is elevated in periodontitis <sup>[2]</sup>. There's also new evidence that periodontitis may be associated with incident chronic liver disease <sup>[3]</sup> or that periodontitis may lead to complications during pregnancy <sup>[4]</sup>. Several systemic diseases or the medication used for them may also have oral manifestations and thus lead to oral diseases. All in all we may say that oral health has importance for several reasons. (Photo 1.)





PHOTO 1. Treatment of dental plaque, professional oral hygiene (kuva: Sergii Kuchugurnyi/Shutterstock.com)

## Oral health in Finland

In Finland National Institute for Health and Welfare (THL) organized the survey called Health 2011 which argued that health, functioning and welfare have improved among Finns since year 2000. Publication "Health, functional capacity and welfare in Finland in 2011" indicated some positive development also in oral health, mainly seen in daily care taking of dental hygiene and subjectively felt oral wellbeing <sup>[6]</sup>. Still, despite all the efforts of prevention, dental diseases are a common phenomenon in Finland and globally. For example the increasing amount of ageing people is going to have impacts on the need and demand of dental and oral health care. In 1984 the amount of Finnish people aged 65 or more was 12,5 %, in 2014 it was already 20 % and the estimation for 2030 is 26 % <sup>[6]</sup>. Thus National Institute for Health and Welfare in Finland has brought out guidelines for "Improving oral health for ageing population – new operation models" in 2015 <sup>[7]</sup>.

## Health promotion

The concept of health promotion was brought to Finland by the Ottawa Charter for Health Promotion in 1986. Still the concept has different meanings for different persons or operators. Some may think health promotion simply aims to maintain and promote individual's health but it also has the aspect of person's own behavior when controlling, mastering and improving health - health promotion is aiming to meet the needs of citizen's, communities and societies <sup>[8]</sup>.

One nice and approachable way to improve public knowledge of oral health is to make use of Finnish Dental Association's campaign, "[I love suu](#)". There's a lot of practical and useful information of oral caretaking and diseases together with some links, videos and tests. Finnish Dental Association also encourages its' members to collaborate with regional Diabetes Associations in order to improve general knowledge of the relationship between diabetes mellitus and periodontal diseases <sup>[9]</sup>.

In 2013 Finnish Ministry of Social Affairs and Health published the report "Oral health for all citizens 2013", which includes goals and proposals for improving the state of oral health care services in Finland. The goals are e.g. to focus on health promotion and prevention for all Finnish citizens and emphasize the patient oriented approach. One of the proposals is development and intensification of sharing work between dental professionals. By the proposal it is important to take full advantage of the competences of each dental professional as well as pay attention to changes in the future within oral health care services <sup>[10]</sup>. (Photo 2.)



PHOTO 2. A child with a dental hygienist in a dental office (photo: Studio Romantic/Shutterstock.com)

## Interdisciplinary dental care

In March 2017 editor-in-chief **Anja Eerola** deals the sharing of work in dental care in her article in Finnish Dental Journal. She reminds that collective guidelines for sharing the work, drawn up together with trade unions of dentists, dental hygienists and dental nurses, already exist in Finland.

First of all it's essential to understand the basis of sharing work – we need to notice and pay attention to dental professional's education, praxis, competences and responsibilities. Patient has the right for adequate treatment and it's a dentist that carries the main responsibility for confirming it. Superiors are responsible for the tasks dental personnel are performing but the dental professionals also need to recognize their own abilities and possible limitations in their work. Undoubtedly all practices of sharing work are decided and approved co-operatively and also the salaries are evaluated and rerated if necessary <sup>[11]</sup>.

## Role of Finnish dental hygienist in oral health promotion

Now then, what is the role of Finnish dental hygienist in oral health promotion? By EU manual of Dental practice 2015 there was 1 490 dental hygienists and 4 500 dentists in 2013 in Finland with population of 5,4 million people. If compared, e.g. in Norway there's 900 dental hygienists and 5 300 dentists, population of 5 million people whereas in Italy there's approximately 60 million citizens, 6 000 dental hygienists and 58 700 dentists. As a conclusion we could say that the profession of dental hygienist is quite well established in Finland <sup>[12]</sup>.

If we check the tasks that dental hygienists are allowed to undertake in different countries, prevention and oral health counselling are frequently mentioned in addition to other procedures, e.g. scaling and polishing <sup>[13]</sup>. In European Dental Hygienists' Federation's resolution from 2015, "Professional Profile and Competences of Dental Hygienists in Europe", dental hygienist is mentioned to be the key provider of preventive oral care in order to promote and improve the oral health of individuals, families and groups in society. Oral health promotion and the prevention of oral diseases are also documented to be main competences of a legalized dental hygienist <sup>[14]</sup>.

In Finland the dental examination, diagnosis and planning is restricted to dentists as well as e.g. "drilling, filling, extracting"- invasive treatment of the teeth. Especially in private sector dental hygienist mainly focuses

on periodontal treatment and as a matter of fact this is also a great opportunity to inform patient of his oral health status and the possibilities to improve it. In Finland most patients get the oral care-taking and dietary information from dental hygienist. With children at high risk of dental caries, dental sealants may be used and usually a dental hygienist applies them in public sector's dental clinics, municipal health centers.

Dental hygienist may also undertake "health checks" between the examinations done by dentists, e.g. check of children's oral health. In Finland there's also been few experimentations where patient first meets a dental hygienist who does the checking and only if needed, patient meets a dentist. Currently it is a quite rarely used method but possibly this becomes more popular as the law of dental hygienist's right of judging the use of radiation with intraoral examinations comes into effect.

In the degree program of dental hygiene in Oulu University of Applied Sciences, health promotion has a significant role and importance in curriculum with 25 ECTS of professional studies of health promotion. Within their studies students of dental hygiene have organized and performed multiple projects and events e.g. in schools, different institutions and hospitals or other occasions. In our educational dental clinic "Dentopolis" we have the possibility to train real-life patient's interdisciplinary dental care in practice together with students of dental hygiene and dentistry. Besides that the case-seminars of actual patients' treatment are arranged regularly and they are necessitated in the curriculums and study plans of the students of dental hygiene and dentistry. We share the same goal - individual's appropriate status of oral health is the priority of both professionals.

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# Importance of Oral Self-Care

Elgbacka Suvi, Erola Ella-Liisa, Haikala Iida, Keskitalo Rosa, Manninen Hanne, Penttilä Jenna, Jussila Aino-Liisa

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**Tooth brushing is relevant for promoting good dental and oral health. Periodontal diseases are quite common among young adults and they also have bigger need for periodontal treatment than for caries treatments. Gingivitis is a sign of poor oral hygiene and it can progress to periodontitis. Caries and periodontal diseases can be avoided by brushing teeth twice a day and cleaning tooth caps once a day.**

We went to the Oulu International School on the 22nd of February 2019 to organize a teaching event there for ninth grade pupils. Our dental hygiene student group had four different stands there about the importance of oral self-care. We also made a quiz to the pupils. The pupils had quite good knowledge about oral self-care and most of them got right answers to most of the questions. If not, we told them the right answers. In the end of the event the pupils also filled a questionnaire about the event. (Photos 1–3.)



PHOTOS 1–3. Students of Oulu International School had very good knowledge about oral self-care (Photos: Haikala Iida)

## Introduction

In this article we describe different issues about the importance of oral self-care. The purpose of this article is to provide general information about maintaining a good oral hygiene and teach how to clean your mouth.

The content of this article is based on scientific articles and textbooks. We discuss about several topics that have influence on oral self-care. We introduce for example the importance of regular teeth brushing and how to keep your interdentals clean. We also introduce how to avoid different mouth diseases and describe the two biggest gum diseases – gingivitis and periodontitis. In the end we also discuss about dental caries.

## Importance of regular teeth brushing

### Brush your teeth every morning and evening

Tooth brushing is important for promoting good dental and periodontal health. The effectiveness of plaque removal is affected by brushing technique, duration and force. Professional recommendations say that teeth should be cleaned at least twice a day. Brushing your teeth should last at least two minutes. <sup>[1]</sup> Fluoride toothpastes are clinically proven to prevent and control dental caries. Fluoride toothpaste should be used twice a day. After brushing your teeth with fluoride toothpaste you should not rinse your mouth with plenty of water. <sup>[2]</sup>

The powered toothbrush is significantly more effective in removing plaque than the manual toothbrush <sup>[3]</sup>, <sup>[4]</sup>. When you use a manual toothbrush correctly appropriate amount of time it can be very effective in removing plaque.

## Right technique is a base of everything

According to the studies, toothbrushes that use rotation oscillation motion, do remove considerably more plaque in short and long term. Because of that, it is better to use powered toothbrush. A powered toothbrush does the rotation oscillation motion by itself. For that reason, you have to move it slowly. As was mentioned before, the powered toothbrush is better in removing plaque than a manual toothbrush. <sup>[4]</sup> According to the studies, the mechanical plaque removal is necessary in the prevention of dental diseases like dental caries, gingivitis and periodontitis. As said before, a manual toothbrush can be effective in removing dental plaque, when used right and for the right amount of time. <sup>[4]</sup>

When you use a manual toothbrush, the brush should be angled at 45 degrees to the line of your gums. Then you have to gently move the brush back and forth in short strokes. You have to be careful not to push too hard and brush outer, inner and chewing surfaces of your teeth. You can brush the inside of the front teeth more efficiently if you tilt the brush vertically and make up and down strokes. Remember to clean your tongue too. <sup>[5]</sup>

## Remember also clean your interdentals

### Floss once a day

It is well known that the two most important oral diseases, caries and periodontal disease, are caused by bacteria. This bacterial layer, known as plaque, should be removed daily to promote oral health care. <sup>[6]</sup> Even if toothbrushing is a profitable and most common method to remove dental plaque, it alone is not an adequate way to prevent periodontal diseases. That is because toothbrush cannot reach interproximal areas and without flossing or interdental brushing these areas are left unclear. <sup>[7]</sup> According to report of the American Dental Association (ADA), up to 80 % of plaque may be removed by flossing <sup>[7]</sup>.

According to the Finnish Dental Association, interdental cleaning should be done once a day and teeth brushing twice a day. Interdental cleaning should be done properly by using the right tools. <sup>[6]</sup> The main problem with using dental floss is that flossing can be difficult to do effectively, especially if you do not know how it should be done. Because of that, it is very important to make sure with dental professionals, that you know and are trained well to clean your tooth gaps properly with the right tools. <sup>[6]</sup>

Interdental cleaning is most effective when it is done before brushing. Consequently, the bacterial layer is removed from tooth gaps and fluoride of the toothpaste can be spread into the tooth gaps. <sup>[8]</sup> It does not matter, which time of day you clean your interdentals. The most important thing is, that cleaning tooth gaps with floss or another interdental cleaner is done daily. It can be done at morning or before going to sleep at night. <sup>[9]</sup>

### Different ways of cleaning the tooth gaps

There are many ways to clean interdentals. You can use floss, interdental brush or toothpick. Floss is a good way to remove plaque from the tooth gaps, when the interdentals are narrow and have very small gaps. There are a wide range of flosses, and usually the floss is made of waxed or unwaxed nylon. Waxed floss slides better in interdentals so it's easier to use between closely spaced teeth. You can also choose between flavored or unflavored and wide or regular size floss. <sup>[10]</sup>

If you find using floss with fingers hard, you can make flossing easier with holders. There are different kind of floss picks, which hold the floss for you making it very easy since you only have to use one hand. <sup>[11]</sup> You can choose if you want short- or long-handled floss holder and there is also different models and colors available. Long-handled pre-threaded flossers are particularly good for cleaning the back of your mouth.

If you have big gaps between your teeth, interdental brushes can be better than floss. There are many different sizes of interdental brushes between 0,4 mm to 1,5 mm. Brushes look like little bottle cleaners. <sup>[12]</sup> You can clean tooth gaps also with wooden or plastic interdental toothpicks, that can be round or triangular.

## What happens if you don't take care of your mouth?

### Gingivitis

Epidemiologic studies indicate consistently, that the gingival inflammation is a highly prevalent condition. It is a common gum disease, that causes irritation, redness and swelling of gingiva. Symptoms of gingivitis are also

that gums are tender and receding. Healthy gums are firm, pale pink and fitted tightly around the teeth. Gums can also bleed easily during brushing and flossing. When considering gingivitis, the most investigated self-reported symptom is "bleeding from gums". A sign of gingivitis can also be a bad breath. Gingival inflammation is a ubiquitous finding in children and adults worldwide. <sup>[13]</sup>

Gingivitis can occur only within two to ten days, if the plaque is allowed to accumulate on the teeth. Gingivitis is a common problem in the adult population. In the Finnish dental adult population, gingivitis occurs in 74 %. Men have gingivitis little more often than women. Smoking reduces blood vessels and therefore with people that smoke may gingivitis leave unnoticed. <sup>[14]</sup>

At the end of the event we held a feedback survey to find out, whether the pupils remembered anything they were taught. There were two questions about oral self-care. We asked "How can you avoid inflammation in your gums?" and if you have inflammation in your gums what kind of symptoms do you have? A total of 45 students responded to the feedback survey.

Good oral habits help to prevent and reverse gingivitis. The most common cause of gingivitis is poor oral hygiene that encourages plaque to form on the teeth causing inflammation of the surrounding gum. Plaque forms on your teeth, when starches and sugars in food interact with bacteria in your mouth. Plaque, that stays on your teeth can harden also under your gumline into tartar. Tartar makes plaque more difficult to remove, creates a protective shield for bacteria and causes irritation along the gumline. The longer the plaque and tartar remain on teeth, the more they irritate the gingiva, the part of your gum around the base of teeth, causing inflammation. If not treated, gingivitis can lead to much more serious gum disease called periodontitis and tooth loss. <sup>[15]</sup>

## Unknown periodontitis

Sometimes gingivitis develop into periodontitis <sup>[16]</sup>. Periodontitis is inflammation in the gingiva. It effects the supporting structures of the teeth, which can lead to loss of tooth and contribute to systemic inflammation. Primarily periodontitis is adult's disease, but also children may have it. <sup>[17]</sup>

Periodontal disease begins of the dental plaque. Then it interacts with the immune defenses of the host, leading to the inflammation and disease. The situation will last until the microbial biofilm is therapeutically removed and the inflammation settle or affected tooth is extracted. <sup>[17]</sup>

The severity of the periodontal disease depends on environmental and host modifiable and non-modifiable risk factors. Daily self-performed oral hygiene and professional removal of the dental plaque are prevention for periodontal disease. <sup>[17]</sup>

## Dental caries

Dental caries is a multifactorial disease. It cannot be attributed to a single cause. There are three main factors that are related to the causation of dental caries. Main factors are oral bacteria in dental plaque, presence of fermentable carbohydrates and tooth surface. Oral hygiene habits, shape of the tooth, surface characteristics, eating habits and quality and quantity of saliva can also increase or decrease the speed of decay of teeth. <sup>[18]</sup>

As time passes, the acids in the dental plaque can demineralize enamel and dentin. The first sign of dental caries is the so-called white spot lesion. If the demineralization can continue the surfaces of the white spot will cavitate causing a cavity. <sup>[19]</sup>

## Conclusions

You must have right tools and ways to take care of your mouth, so that you can have a good oral health. That is how you can prevent gingivitis, periodontitis and dental caries. In our article there is told how you can keep your oral health at a good level with right brushing technique and interdental cleaning.

Generally, the pupils of Oulu International School knew oral self-care well. They knew the right answers to the questions because oral self-care is quite familiar thing to them. Pupils were particularly interested when we told them about gingivitis. Pupils were interested in how gingivitis is created and how it could be prevented. Most of the pupils knew the symptoms of gingivitis and we think that is a good thing.

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# Motivation as a Tool for Dental Hygiene

Heiskanen Jake, Palo Johanna, Outila Iida, Vuorma Mari, Jussila Aino-Liisa

28.6.2019 ::

Dental hygienist students of Oulu University of Applied Sciences (OUAS) are arranging an event in the International School in Oulu for the 7th graders. Aim of the event is to teach the youth important facts about dental health. Brushing teeth regularly twice a day, avoiding snacks, drinking water instead of juices and soft drinks, and having xylitol after every meal are the best ways of treating your dental health.



PHOTO 1: Arina P Habich/Shutterstock.com

## Introduction

Motivation is defined as individual's interest on certain functions and how the one is capable in monitoring own actions <sup>[1]</sup>. We are motivating the pupils to attend to all the learning points by taking part in the quiz we are arranging. When a pupil has answered all the questions of the quiz correct, they can take part in our lottery. The prices of the lottery are related to dental health.

Motivation is an important way to teach patients in dental hygiene. Dental hygienists' guidance sessions often take place in the dental clinic face-to-face with the patient. That is why keeping up the patient's listening motivation is of great importance, so the discussed talking points can be adopted by the patient.

The way of life of young people could be a risk for their oral health. It has been stated that especially inadequate oral health habits, unhealthy diet (for example eating sweets and drinking soft drinks) and substance abuse are risk factors to oral health and it brings challenges to health promotion. <sup>[2]</sup>



## The teeth eruption

People have two sets of teeth during their life, which include a set of primary teeth and the permanent teeth. Permanent teeth begin to come in around age of six. It varies whether the first permanent teeth are the molars or the incisors. By the age of 13, most of the 28 permanent teeth will be in place. These teeth include four central incisors, four lateral incisors, eight premolars, four canines and eight molars. It is not unusual that the permanent teeth emerge in a different time, because heredity and other factors may influence. <sup>[3]</sup> <sup>[4]</sup> Our target group contain 7th graders, which are 13-14 years old so they all have permanent teeth in place. It's important that young people learn how to take care of permanent teeth from the beginning.

## Oral health and oral health related habits of Finnish youths

The way of life of young people could be a risk for their oral health. It has been stated that especially inadequate oral health habits, unhealthy diet (for example eating sweets and drinking soft drinks) and substance abuse are risk factors to oral health and it brings challenges to health promotion. <sup>[2]</sup>

Teeth brushing habits among the Finnish youths are worrying. Less than 40 % of boys at the age from 13 to 15 and 60 % girls at the same age are brushing their teeth two times a day. <sup>[5]</sup> Finland is ranked among the worst countries as for brushing teeth <sup>[6]</sup> and the worst countries in Europe when it comes to oral hygiene habits. <sup>[7]</sup>

According to a research published in 2017, 2 % of 12-year-old girls and 6 % of 12-year-old boys had tried using tobacco. These experiments have reduced during the research period (1997–2017). When observing the whole research period, distinction between sexes have now become equalized. However, there are still more tobacco using among boys than girls at the age of 12.

Smoking reduces significantly people's oral health. Smoking combined to bad oral hygiene can lead to serious periodontal diseases in early age. It is possible to influence on young people's smoking habits by guiding them. <sup>[8]</sup>

According to Kaikkonen et al. <sup>[9]</sup> caries among children increases with the years in Finland. Even though most of the 3-year-old children has intact teeth, tooth decay was more common among 5-year-old children. Caries increases in every age groups so that children aged from 11 to 14 had already 2 or 3 fillings on average.

## Motivation as a tool for dental hygiene

It was thought for many years that successful motivation in oral health should be based on the knowledge of epidemiology of caries and periodontal diseases and the methods of prevention. Simple, world-wide accepted methods of prevention are not used by the majority although they provide a pronounced reduction of caries and gingivitis. Not enough information is spread regarding sugarless sweets, or prevention by fluoride. Unsuccessful motivation probably also lies in the inadequate assignment of the roles of the patient, his dentist and the social security. <sup>[10]</sup>

Dental hygienists' guidance sessions often take place in the dental clinic face-to-face with the patient. That is why keeping up the patient's listening motivation is of great importance, so the discussed talking points can be adopted by the patient.

Keeping up the patient's listening motivation for example in dental guidance sessions, can be achieved by the instructor's own excitement on the subject. That way the participants are sent out a signal, that these are just the things we want to tell the patient and they really matter for them. Listening is an active process and the participants need motivation, so they can listen to it. It is important to open the contents of the talk with various examples, stories and exercises. Although being too excited can cause a contrary effect in the listeners. <sup>[11]</sup>

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# Oral Health Promotion for Young People

Huhtala Merja, Paasovaara Jonna, Previ Marlene, Riskilä Kreetta, Tikkanen Rinna, Jussila Aino-Liisa  
28.6.2019 ::

This article contains health promotional material about drinks that includes the following subjects: what are the pH-values of different drinks, how much sugar do different drinks contain and why is it important not to drink sweetened drinks along the day. The aim of this article is to provide new information about these matters to knowledge the risks and decrease the usage of sweetened drinks along the day.

## Introduction

Dental caries is the most common disease among children in the world today so it is good to inform about the different risks that cause caries. Drinking sugared beverages is a risk factor for caries. <sup>[1]</sup> The aim of this article is also to clarify how pH affects to the teeth. Best outcome that we could ask for is that people would drink less sweetened drinks during the day.

## Caries

A dynamic relation exists between sugars and oral health. Diet affects the integrity of the teeth; quantity, pH, and composition of the saliva; and plaque pH. Sugars and other fermentable carbohydrates, after being hydrolyzed by salivary amylase, provide substrate for the actions of oral bacteria, which in turn lower plaque and salivary pH. The resultant action is the beginning of tooth demineralization. Consumed sugars are naturally occurring or are added. Many factors in addition to sugars affect the caries process, including the form of food or fluid, the duration of exposure, nutrient composition, sequence of eating, salivary flow, presence of buffers, and oral hygiene. Studies (figure 1) have confirmed the direct relation between intake of dietary sugars and dental caries across the life span. <sup>[2]</sup>

The Keyes diagram depicts the main factors that are necessary for caries to occur.

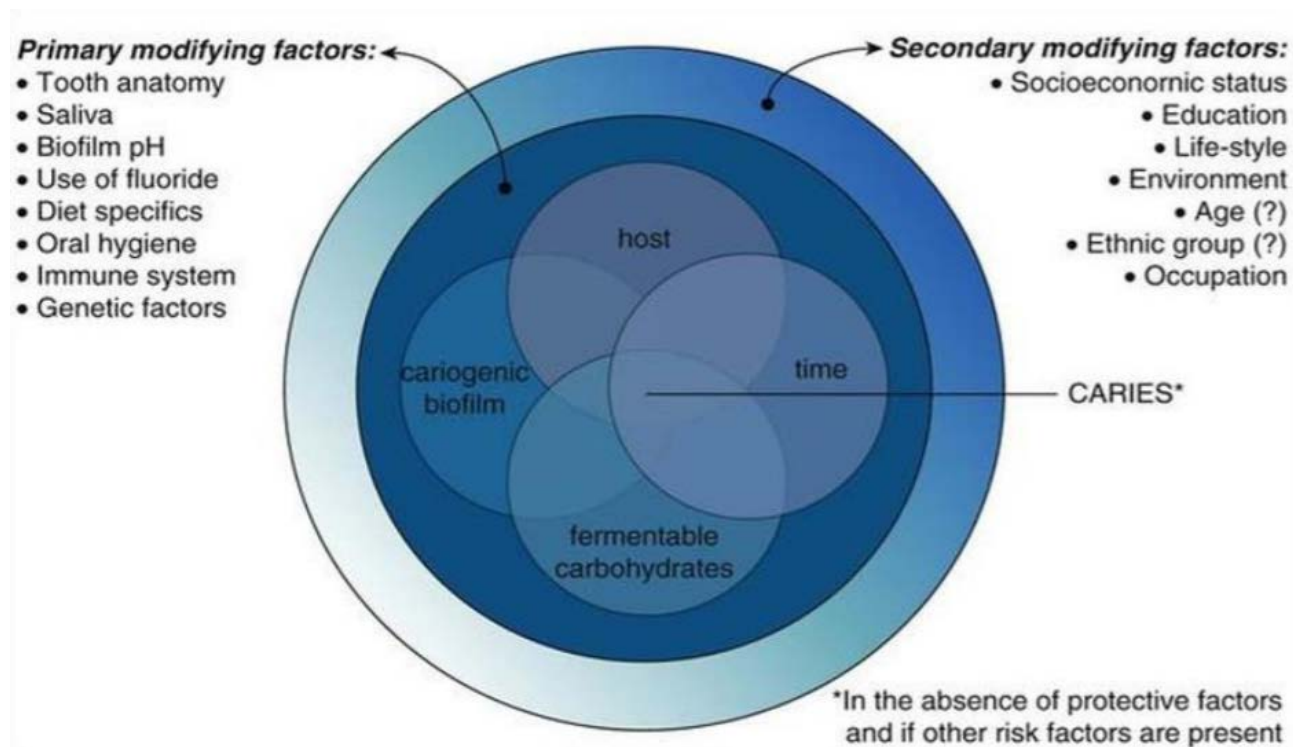


FIGURE 1. Modified Keyes-Jordan Diagram about Caries Risk Factors <sup>[1]</sup>

Since the introduction of fluoride [3], the incidence of caries worldwide has decreased, despite increases in sugars consumption. Other dietary factors (eg, the presence of buffers in dairy products; the use of sugarless chewing gum, particularly gum containing xylitol; and the consumption of sugars as part of meals rather than between meals) may reduce the risk of caries. The primary public health measures for reducing caries risk, from a nutrition perspective, are the consumption of a balanced diet and adherence to dietary guidelines and the dietary reference intakes; from a dental perspective, the primary public health measures are the use of topical fluorides and consumption of fluoridated water. (Figure 2.)

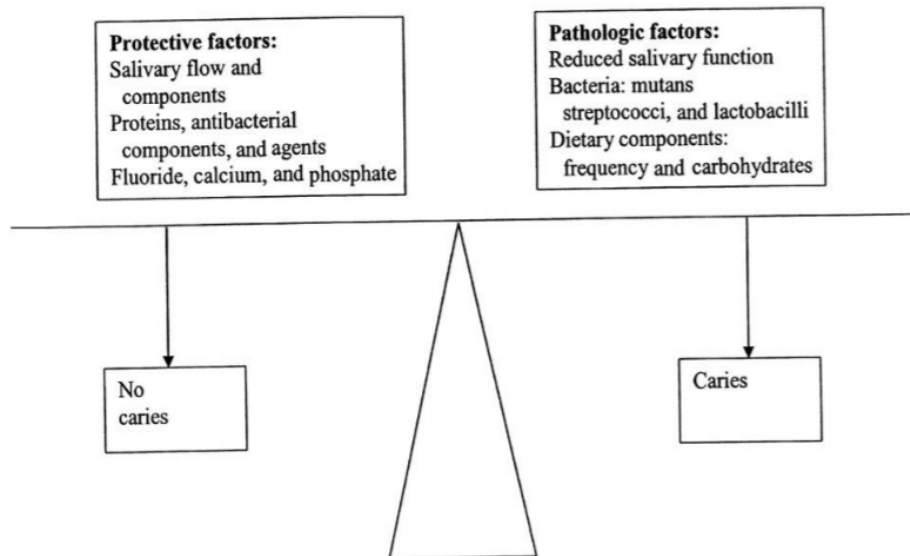


FIGURE 2. Diagram of the balance between pathologic and protective factors in the caries process [2]

The main indexes used for dentition are: DMFT, DMFS, dmft, and dmfs (decayed, missing, filled, teeth or surfaces); they refer to permanent dentition when written in uppercase letters; and to primary dentition when written in lowercase letters. [2]. The WHO goal of a mean DMFT for 12-year-olds at 1.5 or below before the year 2020 is already fulfilled in Finland (figure 3). However, it seems there is still work to do to attain the goal of at least 80 % caries free 6-year-olds in 2020. The available data do not distinguish differences between urban and rural areas, nor ethnic and socio-economic differences. It's interesting to see that in Finland 5-year-olds children had higher dmft-scores than 6-year-olds. [4]

### Dental caries levels (DMFT) among 12-years-old, December 2014

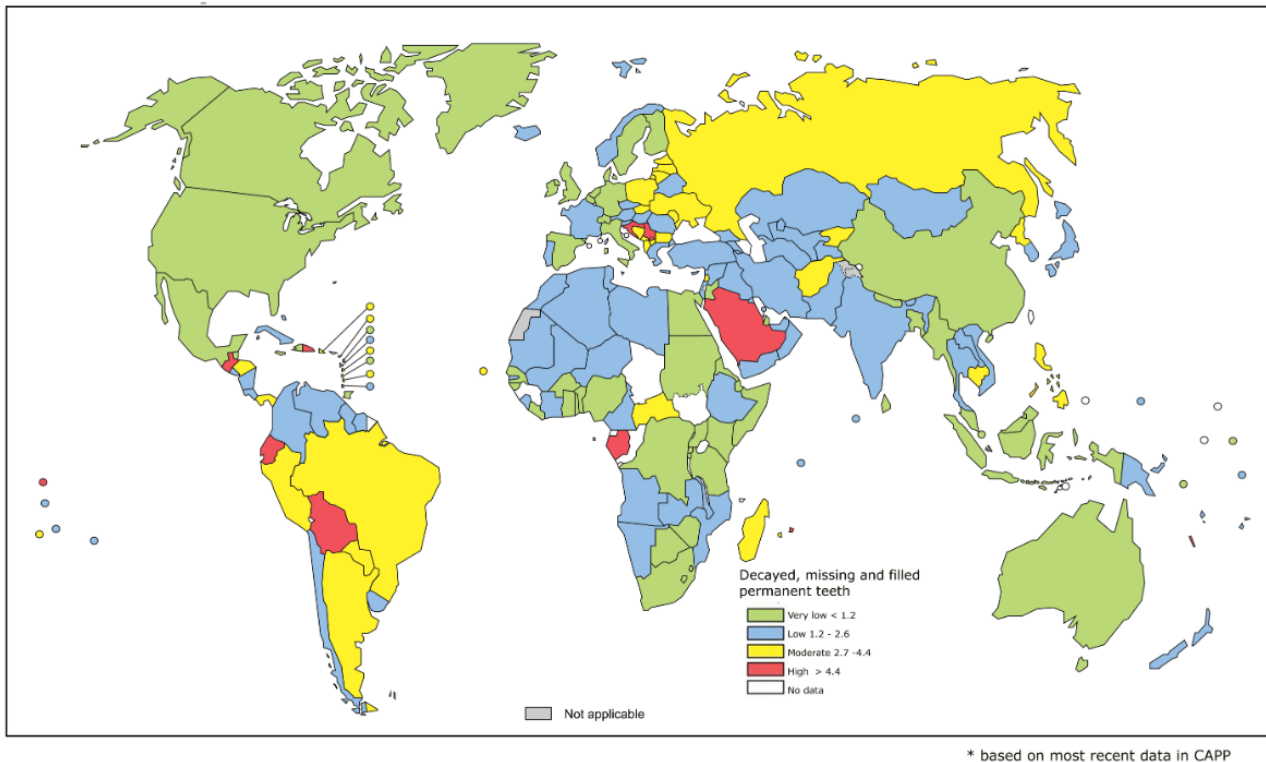


FIGURE 3. World map on dental caries: dental caries level <sup>[31]</sup>

Especially, the high content of sugar in sweetened drinks has been associated with the presence of dental caries. It's essential to consider that although bacteria produce acids that are considered to be a cause of caries, the bacteria themselves do not produce sufficient acid to demineralize tooth enamel. Therefore, it is the presence of sugars or cooked foods rich in starch that increase the production of acids. For this reason, it is necessary that the parental figures modify their children's unhealthy behaviors at an early age. Furthermore, the implementation of public policies to reduce the consumption of sweetened beverages, such as increasing taxes on these products, may help to prevent tooth decay and tooth loss. <sup>[51]</sup>

## Tooth erosion

Low pH and high buffer capacity of drinks are the major risk factors, while calcium is the main protective factor. Reduction of frequency of consumption and contact time of erosive drinks with teeth and consumption of dairy products are advisable. Tooth erosion is a chemical-mechanical process that results in a cumulative loss of dental hard tissue. Its ultimate causative factors are non-bacterial acids and mechanical abrasive forces. Frequent consumption of soft drinks and fruit juices significantly increases the prevalence of tooth erosion. Some weak acids can have high buffer capacity at a specific pH and so they can keep tooth dissolution during long periods of contacts. There is no critical pH value for erosion. The critical pH value depends on the tooth tissue and on the concentrations of calcium and phosphate in the solution. Yogurt is a good example of this, since its pH is around 4, but it's not erosive since it has high calcium concentration. (Table 1.) <sup>[61]</sup>



TABLE 1. pH values of different drinks <sup>[41]</sup>

Don't contain harmful acids	Contain harmful sugar and/or acids
Milk 6,7	Orange juice 3,8
Coffee with milk 6,4	Ice tea 3,4
Tea (black) 5,8	Energy drink 2,9
Ordinary mineral water 5,6	Coffee with sugar 4,9
Coffee without sugar 4,9	Ordinary soft drink 3,0
Buttermilk 4,5	Diet cola 2,8
Beer 4,5	Ordinary cola 2,4
	Vines and ciders 3-4

The pH scale measures how basic or acidic a substance is. The pH scale ranges from 0 to 14. A pH of 7 is neutral. A pH greater than 7 is basic and a pH less than 7 is acidic. <sup>[7]</sup> There is risk of dental erosion when a pH is below 5.5 and drink contains harmful acids, most commonly citric acid (E 330) <sup>[8]</sup>.

## Tooth development

As in other aspects of human growth and development, nutrition has an effect on the develop-ing tooth. Essential nutrients for a healthy tooth include calcium, phosphorus, and vitamins A, C, and D. Calcium and phosphorus are needed to properly form the hydroxyapatite crystals, and their levels in the blood are maintained by vitamin D. Vitamin A is necessary for the formation of keratin, as vitamin C is for collagen. Fluoride, although not a nutrient, is incorporated into the hydroxyapatite crystal of a developing tooth and bones. <sup>[9]</sup> At the age of thirteen to sixteen, after teething, teeth are still developing. At the developing phase teeth are fragile to any kind of damage. <sup>[10]</sup> That's why good oral health and nutrition is so important in that phase of life. (Table 2.)

TABLE 2. The development timeline of human permanent teeth <sup>[5]</sup>

	Maxillary (upper) teeth							
Permanent teeth	Central incisor	Lateral incisor	Canine	First premolar	Second premolar	First molar	Second molar	Third molar
Initial calcification	3–4 mo	10–12 mo	4–5 mo	1.5–1.75 yr	2–2.25 yr	at birth	2.5–3 yr	7–9 yr
Crown completed	4–5 yr	4–5 yr	6–7 yr	5–6 yr	6–7 yr	2.5–3 yr	7–8 yr	12–16 yr
Root completed	10 yr	11 yr	13–15 yr	12–13 yr	12–14 yr	9–10 yr	14–16 yr	18–25 yr
	Mandibular (lower) teeth							
Initial calcification	3–4 mo	3–4 mo	4–5 mo	1.5–2 yr	2.25–2.5 yr	at birth	2.5–3 yr	8–10 yr
Crown completed	4–5 yr	4–5 yr	6–7 yr	5–6 yr	6–7 yr	2.5–3 yr	7–8 yr	12–16 yr
Root completed	9 yr	10 yr	12–14 yr	12–13 yr	13–14 yr	9–10 yr	14–15 yr	18–25 yr

## Discussion

For our stand (photo 1) we wanted to do something that would be interesting and exciting for the students. We wanted that the students had an opportunity to take part in our stand. We achieved this by organizing some tasks for our stand. First task was to match the correct drink and pH-value. One of the pH-values was extra, as seen in the picture (pH 9,6), that we added in as a joker. The second task was to match the correct drink and the amount of sugar it had. Some of the drinks didn't have any sugar, for example unsweetened tea and coffee or water. After the students were done with the tasks, we checked whether their answers were correct and told them the right answers if some of their answers were wrong. We then proceeded to tell more about how pH

affects one's teeth by showing a short video about the effects of tooth erosion. We also discussed what should be drunk when you're thirsty and how many acid attacks can teeth withstand during the day.

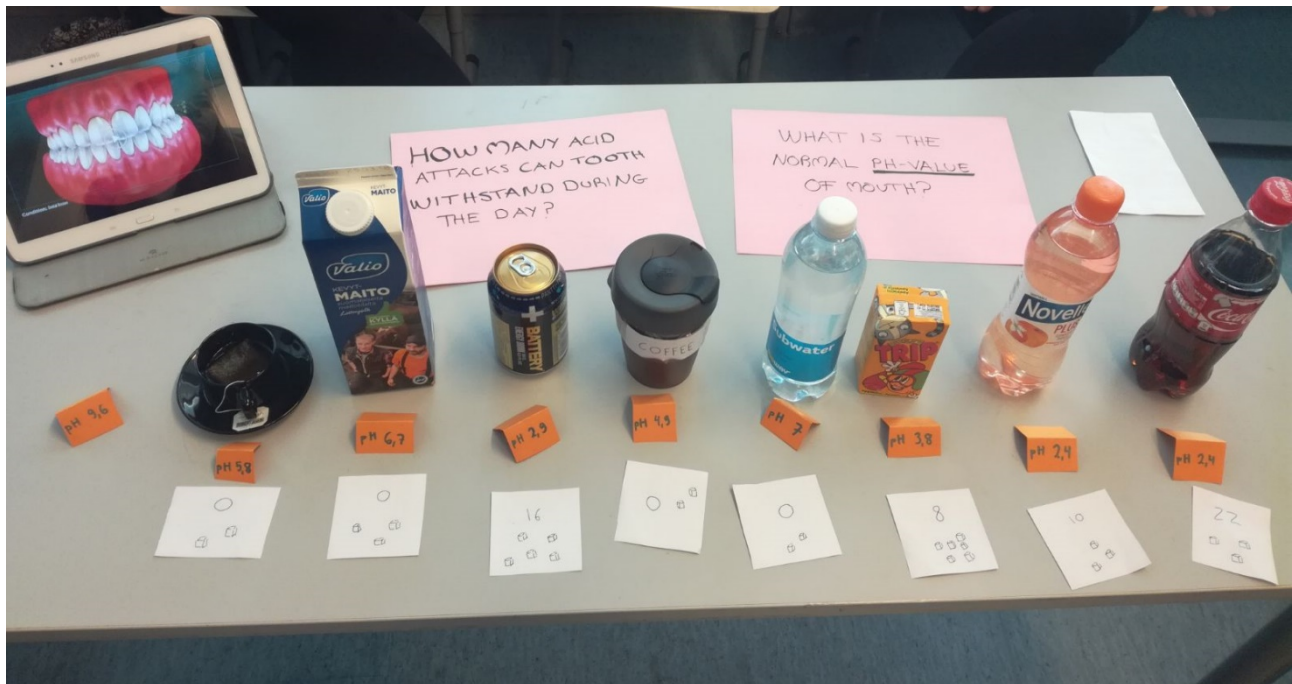


PHOTO 1. Our stand at the event (photo: Paasovaara Jonna)

The event in over all went really well. At first we had some difficulties with time consumption and had to take out some minor things that we planned to discuss at our stand. The students were really excited and participated well at our stand. They told us about their own experiences and whether they liked to drink soft drinks or not. Most of the students didn't like drinking soft drinks, but there were some that would drink them a bit too often. We were surprised how some of the students didn't know what pH means but at the same time there were students in class that knew. We weren't exactly prepared for this, but luckily we knew how to quickly explain the basis of pH and what it means. We could have prepared ourselves better with our stand by, for example, practicing what we were going to talk about and check how much time it would take. If we had practiced a bit more, we wouldn't have had problem with our usage of time.

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# Xylitol and its Benefits on Oral Health

**Boricheva Ekaterina, Elsilä Saara, Häkkinen Eveliina, Karjalainen Laura, Kinnunen Elina, Laapotti Laura, Ballardin Lisa, Jussila Aino-Liisa**

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**Xylitol is a product found from plants and it can prevent tooth decay. Natural products such as vegetables, fruits and birch bark contain xylitol. Xylitol can also be added into many products. Using xylitol chewing gum or pastilles after every meal is an easy way to stop acid attack and keep teeth to remain healthy. Recommended daily dosage of xylitol is five grams which equates about six pieces of chewing gum. For getting the best results xylitol products should be used regularly.**

## Introduction

In this article the studies about xylitol and its benefits on oral health is reviewed. In addition, the oral health promotion event in Oulu International School for 9th graders is described. The aim of the event was to clarify the effects of xylitol to oral health. At our stand (photo 1) the pupils were given information about the benefits of using xylitol and making small experiment with saliva's pH-levels, acid attack and xylitol gum. With the experiment the pupils were shown how effectively xylitol can help producing saliva and stopping acid attack after eating or drinking. The pupils already knew a lot about the benefits of xylitol, but after the event they knew more detailed information and explanations how and why xylitol works.



PHOTO 1. Giving information about benefits of using xylitol in Oulu International School (photo: Kinnunen Elina)

Xylitol is a natural sugar alcohol that can be found from plants. It can be produced for commercial use like chewing gums and pastilles. For example this meta-analysis [\[1\]](#) show that xylitol has oral health benefits. Bacteria that causes tooth decay cannot use xylitol as their nutrition. It also helps to increase the secretion of saliva. Xylitol is recommended especially for children and people with increased caries risk as it reduces oral count of mutans streptococci. People who suffer from dry mouth also benefit from xylitol.



## What is Xylitol?

Xylitol is a pentahydroxy sugar alcohol which exists in a very low quantity in fruits and vegetables (plums, strawberries, cauliflower and pumpkin). On commercial scale, xylitol can be produced by chemical and biotechnological processes. <sup>[2]</sup> The chemical production of this sugar is quite expensive and it requires intensive process. The name xylitol relates to the word xylose (wood sugar) from which xylitol was first made, and which is in turn derived from the particular structure (xylene) of hardwood from which xylose can be obtained <sup>[3]</sup>. Xylitol was discovered at least from the 1890's by German and French <sup>[4]</sup>.

The use of xylitol is relatively common in several European countries like Finland, German and Italy. It is also known among Chinese and Japanese researchers. Compared with glucose in healthy subjects, xylitol causes a much smaller increase in serum insulin and blood glucose levels with no "rebound" hypoglycemia (glycemic index: xylitol=7, glucose=100). <sup>[3]</sup>

Xylitol replaces the sucrose of different food to avoid caries in the oral health. It reduces the levels of mutant streptococci and lactobacilli, and it can be protective against periodontal diseases. <sup>[5]</sup> For this reason, xylitol can be contained in toothpaste (also with fluoride) for preventing caries in permanent teeth of children. <sup>[6]</sup>

Products with xylitol can be divided into two groups. First group consist of natural products, which contain xylitol such as vegetables, fruits and birch bark. The second group includes products to which xylitol has been added by humans. The most common and popular among them is chewing gum. Alternative to chewing gum are pastilles, tablets, dragées (for example for patients with bite problems). Xylitol can also be included in toothpastes, mouthwashes, sprays, gels, 'artificial saliva' and even in candies. <sup>[7]</sup>

## How does it work?

Xylitol has several chemical and biological properties and reactions which are caries preventative. Due to its pentitol nature, xylitol does not support dental plaque growth. Xylitol can form chemical complexes with calcium ion in saliva, which contribute to the remineralization of already existing caries lesions. Xylitol decreases the growth of mutans streptococci by affecting the bacteria's structure and acid production. <sup>[2]</sup> It disrupts the energy production of mutans streptococci, leading to futile energy cycle and cell death. <sup>[4]</sup> It reduces the cariogenicity of plaque by decreasing the metabolism of all carbohydrates. With the long-term usage of xylitol, dental plaque becomes less adhesive to itself and tooth surfaces. Xylitol usage among infants' mothers as been found to prevent the transmission of caries from mother to child. <sup>[2]</sup>

Xylitol also has so called passive effects, which can be found caries preventative. It increases salivation and when used as a sugar substitute, the progression of caries decreases because cariogenic organisms no longer have their normal growth substrate, sucrose. <sup>[8]</sup>

## Is it safe?

Researches has proven that xylitol is safe for humans. Over the years there has been scientific studies worldwide of toxicological and nutritional safety of xylitol and long-term consumption of xylitol for diabetic people (e.g <sup>[9]</sup>). The conclusion of those studies has been that xylitol is safe to use. One of those studies was made in Turku during the 1970's and the purpose of that study was to test safety of xylitol on humans. Subjects consumed xylitol daily in large amounts for two years. The results showed that there were no pathological findings on blood and urine chemistry analyses and no harmful long-term side-effects were found <sup>[7]</sup>. Humans tolerate xylitol well, but for some people large consumption of it can cause stomach pain or diarrhea <sup>[10]</sup>.

Xylitol is safe for diabetic people too. Xylitol is slowly absorbed and metabolized by human bodies which leads to only slight changes in insulin levels. Researches has found that because of xylitol's low glycolic index it's ideal sweetener for maintaining steady levels of insulin and blood sugar <sup>[11]</sup>.

## Who will benefit from xylitol?

Using xylitol from early age improves oral health of children and reduces the oral count of mutans streptococci. A caries prevention experiment in infants was demonstrated at Finnish Public Health Centre in 2002–2011. Parents of the children from the age of 6–8 months started to swab 45 % xylitol onto their children's deciduous teeth by using cotton swabs or children's toothbrush twice a day. Xylitol swabbing treatment continued until the child was 36 months old. As a result, there was a significant reduction in enamel and dentine caries compared to control group of 7- year old children <sup>[12]</sup>. Besides caries, xylitol also prevents ear infections on children.



Streptococcus Pneumoniae which causes acute otitis media, ear infection, cannot exploit xylitol as an energy source. Xylitol decreases these bacteria by modifying their structure and destroying them. Preventing ear infections works only when xylitol is used regularly [13].

Adults also benefit from using xylitol, especially patients with an increased risk of caries. The risk is increased by factors such as poor oral hygiene, dry mouth, different fillings and orthodontic devices. Certain medication like antipsychotic and cardiac medication influence the saliva production by reducing the flow of saliva therefore making its washing effect insufficient. The use of medication increases as person ages. Xylitol products are recommended to patients with Sjogren syndrome and patients receiving radiation therapy to head and neck area because of its stimulating effect on salivary flow due to their impaired activity of salivary glands. [14] Orthodontic patients benefit from using xylitol products as orthodontic devices make cleaning the teeth harder and the devices increase attachment points for bacterial biofilm. Also, special groups like disabled people who cannot manage adequate oral hygiene due to motor difficulties will benefit from using xylitol products as a way of caries prevention. [15]

Finnish Dental Association recommends using xylitol after every meal. Recommended daily dosage of xylitol is five grams, which equates about six pieces of chewing gum. For getting the best results xylitol products should be used regularly. The more chewing gum contains xylitol, the better effect it has on dental health. [16]

## Promoting adolescents' oral health

The students of Health Promotion Project course held a health promotion event in Oulu International School for 9th graders. The students had a stand and they were giving information about benefits of using xylitol and making small experiment with saliva's pH-levels, acid attack and xylitol gum. With the experiment they wanted to show pupils how effectively xylitol can help producing saliva and stop acid attack after eating or drinking. In the experiment pupils were given small cups of soda to drink at first. Soda is a carbonic drink, which lowers the pH-level of mouth below neutral and starts acid attack. After that pupils were given pH-level test to measure their saliva's pH-level. After measurement the next step was to chew xylitol gum for few minutes. During those few minutes the pupils were told important facts about xylitol. When few minutes of chewing had passed pupils were given new pH-level tests to check how xylitol had worked. With pH-level tests pupils could concretely see how quickly pH-level can change and how xylitol can help.

In the end of the event pupils were given a quiz about all the things they had learned during the event. They were asked, "what is the recommended daily intake of xylitol" and "when should you use xylitol". The correct answers were "five grams" and "after every meal". All pupils chose correct answers. Before the event pupils already knew a lot about benefits of xylitol, but after the event they knew more detailed information and explanations on how and why xylitol works.

## Conclusion

Xylitol is a natural sugar alcohol that is generally suitable for everyone to use. Even people with diabetes can safely consume it, because unlike sugar, xylitol has a negligible effect on blood sugar and insulin level. Usually xylitol is used in chewing gums and pastilles but can be also used for example in mouthwashes and toothpastes. It has several health-promoting effects and that's why it is recommended to use regularly after a meal, as it will be the most beneficial for oral health.

Xylitol inhibits the growth of bacteria in the mouth, reduces the formation of plaque, reduces the destruction of tooth enamel and reduces ear infections in children. It also stimulates the salivary flow, which neutralizes acids, removes bacteria and food debris from the mouth. Xylitol is very useful for the people in risk for caries, people with dry-mouth, children, and people with special needs, especially who have some difficulties with brushing. The use of xylitol can prevent the transmission of caries infection from mother to a child.

Xylitol is a good adjunct to protect teeth from caries, but it does not replace brushing. Flossing and brushing are fundamental to good dental health.

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# Nutritional Challenges and their Effects in Oral Health among Ninth-Graders

Tasala Laura, Paso Jaana, Lautamo Elina, Ervasti Katja, Kaisto Salla, Iinatti Sanna-Mari, Jussila Aino-Liisa  
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**Tooth erosion and dental caries prevalence in the younger population have raised concern in the dental community. The main reasons for erosion and caries are poor oral hygiene and consumption of carbonated drinks and acidic sweets and snacks. Informing adolescents of these harmful dietary habits is important in promotion of good oral health. This information was brought to group of ninth-graders aiming to make a positive impact in their eating and drinking habits.**

## Introduction

Dental caries is the most common oral disease, but dental erosion is a rapidly growing problem, especially among young people. The purpose of this article is to clarify the origin of caries and erosion and how to influence to the prevention of these conditions. Regular eating and healthy drinking choices can help to prevent dental caries as well as erosion, which means the dissolution of dental enamel. Surprisingly a snack or a drink, perceived as healthy, in high doses or inappropriately consumed can cause irreparable damage to teeth.

On February 2019 a small functional briefing about dental health for the ninth-grade students was organized at the Oulu International School. On our stand we talked about sugar consumption and the effect of acidic drinks on oral health. Our aim was to show how daily choices can make a big difference to one's oral health. The event was well received among students and we got some good experience of organizing preventive dental care event.

## Caries and erosion

Dental caries is a dynamic process that involves susceptible tooth surfaces, a fermentable carbohydrate source and cariogenic bacteria like *Streptococcus mutans* or *Lactobacillus*. All carbohydrates are generally considered cariogenic, but fermentable carbohydrates are primarily sucrose. Other factors such as lack of motivation for maintaining oral hygiene, socioeconomic and cultural differences, genetics, parenting practices and salivary gland hypofunction, play a major role in dental disease development. The risk of dental caries increases due to frequent consumption of carbohydrates in the form of simple sugars. <sup>[1]</sup>

Dental erosion is an irreversible loss of dental hard tissue that does not involve bacteria and is caused by a chemical process <sup>[2]</sup>. There has been considerable interest in the epidemiology of dental erosion during the last 20 years since there is some evidence that its incidence and prevalence are increasing. <sup>[3]</sup> The presence of non-bacterial acids is related to the nature of tooth erosion in the oral environment. Acids could stem from drinks or food. <sup>[4]</sup> Dental erosion often occurs together with abrasion caused by any material with abrasive effect, and with attrition caused by contact between teeth <sup>[2]</sup>.

In a study among Greek adolescents no significant differences concerning the prevalence of dental erosion were observed between boys and girls. On the other hand, students with higher socioeconomic status appeared to be less prone to develop dental erosion than the other children. <sup>[3]</sup>

## Diet and eating habits in relation to oral health

Diet is one of the main factors in oral health as well as in health as a holistic point of view. Diet and nutrients may have effects on caries risk, soft tissue health and response to injury and infection. While the nutrients help maintain good oral health, cariogenic carbohydrates in food and beverages and acidity of the food harm the oral health. <sup>[5] [6]</sup>

Oral health professionals ought to recognize the harmful food consumption habits of their target group. In counselling schoolchildren, we should put our focus on the importance of regular meals, reducing sugar consumption or using sugar with non-fermented sugar substitutes, avoidance of beverages and brushing of the

teeth with fluoride toothpaste twice a day. Food and drinks containing added sugar combined with snacking, sipping beverages or pocketing food in the mouth increase the caries risk significantly. Snacking has been identified as a popular habit among schoolchildren. In most cases snacks are unhealthy in many ways: snacks contain sugar, fat and are nutrient-poor. <sup>[61]</sup> <sup>[71]</sup>

Eating behavior consists of multiple variables. It has environmental, social as well as personal factors such as family's eating habits and personal attitudes. Therefore, diet counselling is an important part of the oral health prevention but also a challenging task for oral health professionals. We can provide our patients with adequate knowledge, but that is not probably enough to change their unfavorable eating habits. Restricting availability of and accessibility to sugar-sweetened snacks and beverages in schools are a one solution to reduce schoolchildren's sugar consumption. Advertising, marketing and low-costs of the cariogenic, energy-dense food are more difficult problems to tackle. <sup>[61]</sup> <sup>[71]</sup>

## **The effects of soft drink consumption on oral health**

The term soft drink includes sodas and other sugar-sweetened beverages such as fruit juices, lemonade, iced tea, cola drinks and energy drinks <sup>[81]</sup>. Frequent consumption of soft drinks with acids and sugars causes both caries and erosion. Caries lesion involves bacteria whereas dental erosion is determined as a physical result of acid. In addition of sugars and acids, drinking habits, like holding the soft drink for a long time in the mouth before swallowing, boosts the effect of the pH drop and increases the enamel loss.

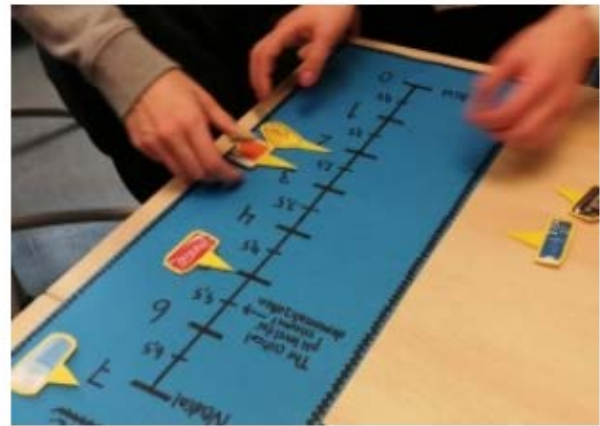
Most soft drinks, especially grape and citric juices, are acidic by nature. Low pH value along with high citrate content increases the surface enamel loss. Carbonated soft drinks usually have lower pH value than fruit juices and are therefore more harmful to the enamel <sup>[91]</sup>. In addition to citric acid, carbonated soft drinks also contain phosphoric acid, which increases the risk of acid attack <sup>[101]</sup>. Although yoghurt and other fermented milk products may also have low pH values, they don't erode the enamel. This is because of their high content of calcium and phosphates, which can minimize the demineralisation process <sup>[111]</sup>.

A research made in 2012 studied the beverage consumption among European adolescents aged 12–18. The study showed that the most used beverages in addition to water were fruit juices and sugar sweetened beverages <sup>[121]</sup>. The large consumption of soft drinks among young people is showing in their dental health very clearly. A recently published Swedish study revealed that 28,3 % of 15 years old and 34,3 % of 17 years old adolescents in Stockholm were diagnosed with dental erosion. The study pointed out that the result correlated directly to the soft drink consumption among young people as they tend to use sugar sweetened beverages and juices as thirst quenchers. <sup>[21]</sup>

Finnish Food Authority has acknowledged the changes in beverage consumption culture. It points out that nowadays' sipping culture may cause damage to teeth, when the acid attacks are frequent and may last long periods of time. The official recommendation is that the primary thirst quencher should be water. Juices, soft drinks, sweetened milk drinks and yoghurt drinks were intended for occasional use only. The frequent use of soft drinks and especially energy drinks are particularly harmful among under 15 year old children. This is because the enamel of the teeth is still forming and hasn't reached its final strength yet and is therefore prone to caries and erosion. In addition of acids and sugar, energy drinks contain a large amount of caffeine and therefore are not suitable for children <sup>[131]</sup>.

## **The Health Promotion Event for Ninth Graders in Oulu International School**

At our stand (photos 1–2) the pupils were asked to estimate the amount of sugar and the pH levels of different products. They also had the opportunity to test the pH levels of milk and of a carbonated beverage. We also answered any possible questions the pupils had concerning oral health.



PHOTOS 1–2. The amount of sugar and the pH levels of different products (photos: Lautamo Elina)

At the end of the event pupils level of knowledge concerning the cause of erosion was tested with a questionnaire. Pupils were given three options to choose the right answer from. The three options given were A) carbonated drinks, B) candy and C) greasy food. Out of 45 pupils one chose all three answers correct, one chose only option B, 13 pupils answered that both A and B are correct and 29 students answered correctly that option A is the cause of erosion. Most of the students chose the right answer but nearly half of them chose another option as well.

## Conclusion

Hannu Hausen, Finland's leading professional of preventive dentistry, brought out dentist's observations of increasing erosion problems in adolescents' dentition in his column in Finnish Dental Journal [14]. At the moment there aren't any accurate data available about the problem, which has been already recognized on the field. The erosion injuries in small children's and adolescents' dentition are increasingly common sight in the dental receptions.

The causes of erosion and caries are multiple and diverse. The main reason is the frequent use of soft drinks. Also, the acidity of the food and irregular mealtimes combined with snacking are significant parts of the problem. Unhealthy diet, in this case especially soft drinks and snacks, are usually containing substantial amount of sugar. Therefore, adolescents' unhealthy eating and drinking habits are multiplying the caries risk. Third aspect in adolescents' oral health is irregularity of eating habits and compensation of proper meals with sugary, energy-dense and nutrient-poor snacks.

Because currently the erosion problem and soft drink use is in the spotlight, we wanted to put the focus on the effect of using soft drinks to oral health in the health promotion event at Oulu International School.

Yet, in the case of preventive dentistry, one should consider also the environmental, social as well as personal factors such as family's eating habits and personal attitudes. Because of the diversity of the adolescents' dental health there is a need for multi-professional work. Only by working together, using comprehensive methods and ways of educating, can we as healthcare professionals meet the challenge of the problem.

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# Effects of Smoking and Nicotine Products on Oral Health

Cozzio Marta, Heikkinen Roosa, Kesti Minna, Lepola Saana, Määttä Jonna, Poikajärvi Laura-Kaisa, Ristaniemi Heli, Jussila Aino-Liisa

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**Smoking is one of the most significant risk factor in many diseases. That's why prohibiting the beginning of smoking and encouraging quitting is very effective way to boost general health. Youngsters are especially vulnerable to start smoking and by targeting adolescents for anti-smoking information, smoking in the future will decrease nationwide. That is why we wanted to study smoking and other nicotine product usage amongst adolescents and their effects on oral health. Regarding the subject we visited ninth graders in Oulu International School and gave them a presentation on nicotine products such as tobacco, smokeless tobacco and e-cigarettes.**

## Introduction

Smoking and other nicotine product usage amongst Finnish youngsters is generally decreasing. According to the latest statistics of The Adolescent Health and Lifestyle Survey 2017 conducted by Ministry of Social Affairs and Health, experimenting with smoking has decreased especially among 14–16-year-olds. Daily smoking among Finnish 12–18-year-olds has been decreasing year by year. Still, in 2017, daily smoking occurred in 2 % of 14-year-old girls and 1 % of 14-year-old boys, and correspondingly, in 8 % of 16-year-old girls and 9% of 16-year-old boys. About 16–17 % of 14-year-olds and about 37–38 % of 16-year-olds had experimented with smoking. Experimenting with snus and use of and experimenting with electronic cigarettes had not significantly changed when compared to the comparable survey of 2015. However, occasional or daily use of snus among 18-year-old boys increased when compared to 2015. Repeated use of water pipe was rare. <sup>[1]</sup>

## Smoking among upper secondary school students

Smoking among young, teenagers has decreased over years. According to a study made in Norway, daily-smoking in adolescence declined 9,5 % in 17 years <sup>[2]</sup>. Another study made in Europe reveals that 30,9 % of teenage people smokes daily and 12,5 % are non-daily smokers <sup>[3]</sup>.

What are the reasons to justify smoking then? Most young smokers say that smoking relaxes them and some confirm that they are addicted to nicotine. <sup>[4]</sup> Young people start to smoke because their parents are smokers and that effects to the level of consumption also <sup>[4]</sup>. On the other hand, great parental supervision is a factor to lower the risk of smoking among children <sup>[5]</sup>. Overt peer pressure and impulsivity affect on starting smoking <sup>[6]</sup>. Having ties with delinquent friends rises the risk of starting smoking <sup>[5]</sup>.

We visited Oulu international school to talk about nicotine products and their health effects on oral health. After our presentation, we asked the pupils to fill out a questionnaire. We wanted to map the nicotine usage among the group anonymously. Smoking in adolescence predicts smoking in young adulthood. If an adolescent is smoking one day per month, there is a tripled change to smoking also in young adulthood. Whereas, if an adolescent is smoking daily, the change of smoking as a young adult is almost quintupled. <sup>[7]</sup> The first question was "Do you use any nicotine products?", and we gladly found out that major part of the group doesn't use any nicotine products. Only one person out of 45 was using some nicotine products (figure 1).

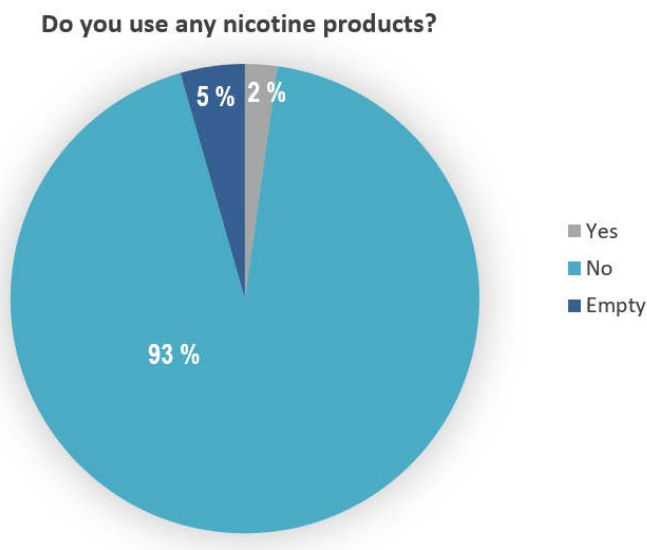


FIGURE 1. Nicotine usage among ninth graders, n=45

After this question we were discussing that at this age group many may have tried some nicotine products but don't consider themselves active users. Adolescence is an especially vulnerable period to smoking initiation and evolution of nicotine addiction. <sup>[8]</sup> That's why we decided to ask if they have tried any nicotine products even once.

With this question we found few more "yes" answers than before. Seven of the 45 pupils had tried nicotine products (figure 2). Positive aspect is that still major part, 87 %, haven't tried any. And because we got only one yes for active usage most of the pupils that have tried, didn't find it worth continuing.

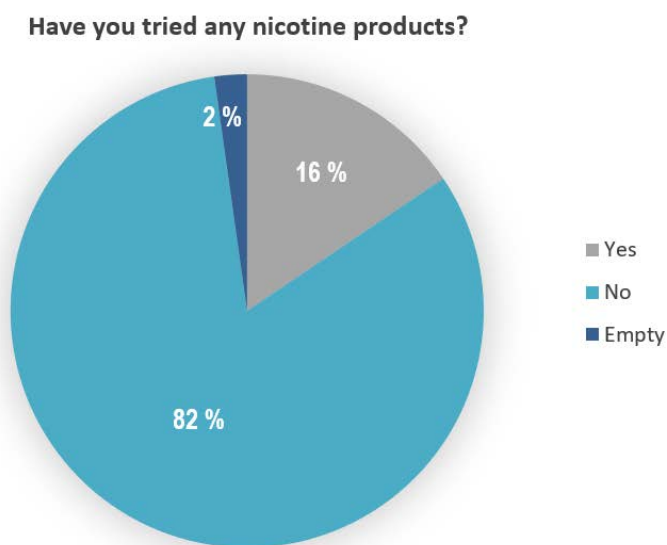


FIGURE 2. Pupils that have tried some nicotine products, n=45

## Disadvantages of smoking and nicotine-containing e-cigarette liquids in the mouth

The use of tobacco products is a significant risk factor for several chronic diseases such as cancer, lung diseases and cardiovascular diseases. Tobacco products contain nicotine, which is a highly addictive psychoactive substance. <sup>[9]</sup> Smoking has side effects on oral health, from aesthetic drawbacks to fatal diseases. The appearance is affected by the discoloration of the teeth, dentures and restorations. The sense of taste and

smell deteriorates, and the breath of the smoker smells bad. Smoking can also lead to gum disease, tooth loss and in more severe cases mouth cancer. (Photo 1.) <sup>[10]</sup>



PHOTO 1. Pupils trying to connect effects of nicotine products under the right title (photo: Poikajärvi Laura-Kaisa)

Electronic cigarette is a relatively new product. That's why there isn't reliable information on their long-term health risks. Cell and animal testing have made it possible to determine that e-cigarettes are harmful, both in short and in long term usage. Studies have found for example COPD like symptoms (chronic obstructive pulmonary disease) and also cancerous cell changes have been reported. E-cigarettes effect oral health nearly like regular cigarettes. Immediate effects are irritation of airways and stubborn cough. Users have reported many negative effects, for example metallic taste, diminished salivation, gum problems, "sugar coated" teeth (resulted mainly from the sugar intended to improve the taste of e-liquids), burning sensation in mouth and throat, irritation on mucous membrane and mouth numbing. <sup>[11]</sup>

E-cigarette users inhale water vapor formed from the liquid that the user has chosen. Often these liquids contain some flavorings and nicotine. Sugar is used to improve the taste of e-cigarette and like otherwise consumed sugar it can cause plaque, calculus, caries and gum problems. Food and Drug Administration of the USA has found small amounts of nitrosamines and diethylene glycol. Also, drug residues such as tadalafil and rimonabant has been found in these liquids. Often the announced nicotine content didn't match the one in the product and there may be variations also in pods of the same liquid. <sup>[12]</sup>

## Smokeless tobacco has known harmful effects

Smokeless tobacco is emerging as a major public health hazard but it is often neglected as a risk factor by many clinicians <sup>[13]</sup>. Typical oral effects of smokeless tobacco are seen on the mucosal surfaces where the product is placed, as well as on the adjacent periodontium. Clinically, the lesion usually clearly marks out from the normal tissues. The lesion can be a white or yellow-brown colour and it may also have wrinkled appearance with increased use of oral tobacco. Other typical oral effects are for example staining of composite restorations and teeth, bad breath and reduction of taste and smell acuity. <sup>[14]</sup>

According to research carried out in the United States of America the smokeless tobacco causes periodontal diseases as well as smoking. A research indicated that amount of plaque was higher in a smokeless tobacco

group than in a smoking group and was statistically significantly higher than in the non-tobacco-consuming group. Probing depth and gingival inflammation were also higher in the smokeless tobacco group than in the smoking group and non-tobacco-consuming groups, but this was not statistically significant. [\[13\]](#)

Smokeless tobacco has been linked previously with tooth loss. Tooth loss was found to be statistically higher in smokeless tobacco users (56 %) and in patients smoking tobacco (58 %) compared with non-users of tobacco (28 %). After all, this research proved smokeless tobacco is also a significant factor to periodontal diseases, as well as smoking, and the patients must be counseled about that by professionals of oral health care. [\[13\]](#)

## The usage of nicotine products and health promotion in Italy

We co-operated with an Italian exchange student for this article to get more international view. In 2018 there were 12.2 million smokers in Italy, that was 23.3% of the population. 19.2 % of women smoke against 27.7 % of men. Survey of 15 000 young people in collaboration with EXPLORA 11.1 % of young people between 14 and 17 years old are regular smokers, 13.9 % are occasional smokers and young who have tried smoking are 20.2 %. There are also around 2 % of ex-smokers. This means that over 47 % of young minors have some contacts with tobacco products. 51.8 % of these young smokers started smoking during high school (over 14 years old), 43.7 % during middle school (between 11 and 13), and 4.5 % in elementary school (between 9 and 10).

Users of e-cigarettes are around 1.1 million in Italy. The majority of users (75.3 %) are represented by dual consumers who smoke traditional cigarettes and at the same time e-cig. About 1.4 million people (2.7 % of the population) tested the new generation tobacco products (heated tobacco). Of these, 54.5 % are smokers, 11.4 % are ex-smokers and 34.1 % have never smoked. These products increase their popularity, their fame in three years increased from 21.5 % to 52.3 %.

## Examples of health promotion

1. Shock images: The strong images and warnings about the risks reported on the packages were not indifferent to the smokers. A survey finds that they were noted by 91,1 % of the smokers. Smokers thought about health risks in 77.7 % of the cases.
2. Telephone number: The "Numero Verde Fumo" (TVF) 800 45 40 88 has received around 50 000 phone calls in 15 years of activity. The service team proposes personalized interventions, offering counseling and helping to reach the local health structures.
3. Campaigns by the Health Ministry: In 2018 the Ministry produced a spot, in which an Italian actor **Nino Frassica** is a psychoanalyst who has two particular patients: the stepmother of Snow White and the Wolf of Little Red Riding Hood. The characters complain about their lives because they smoke. The psychoanalyst advises them to stop, because who doesn't smoke is happier and especially because smoking is the first cause of cancers. In the conclusion the stepmother and the wolf stop smoking and create a happy ending.

## Future without smoking

Organization called "Savuton Suomi 2030" is working for smoke free Finland and hopes to reach their goal, maximum 5 % of adult population smoking, till 2030. Important part of reducing the amount of adults smoking is to prevent beginning of smoking in their teenage years. This is partly the reason why we wanted to talk about how hazardous smoking is with these ninth graders. Unfortunately, we felt that we didn't have enough time to present our topics properly due to limited time and vast information that we wanted to share. In the end questionnaire we asked if there was anything that made them think about their nicotine usage. Only 18 % answered yes (figure 3). But consider that majority of this group hadn't even tried any nicotine products, they might be perfectly happy with their lack of nicotine usage after the presentation. Maybe this question could have been more determined to get more specific answers.



**Was there anything in today's presentation that made you think about your nicotine usage?**

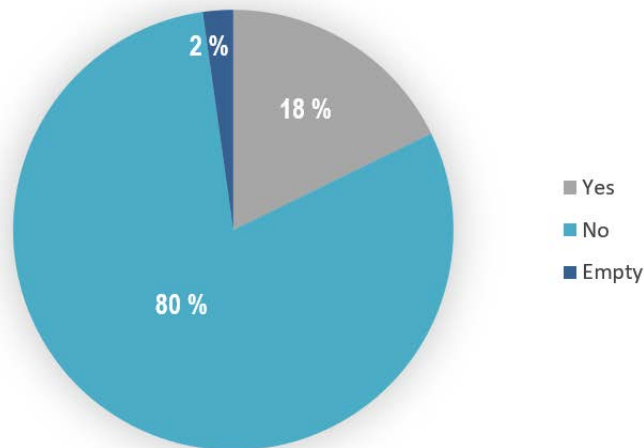


FIGURE 3. Per cents of pupil's that started to think about their nicotine products usage after the presentation, n=45

## Conclusions

Thankfully smoking is decreasing amongst adolescents and by our perspective the target group seemed rather disgusted by the pictures of smokers' mouths. Unfortunately, e-cigarettes seem to be increasingly popular and due to lack of information, often consider healthy option. We wish that more information about modern nicotine products would be distributed for oral health care professionals as well. Then professionals would be able to give better advices for patients and there would be less misinformation.

The figure 4 demonstrates pupils' answers to question: "Did you learn anything new regarding oral health today?". And we were happily surprised that most of the answers told that they learned something new. Because question was general question about the whole lesson, oral self-care, xylitol, nutrition and drinks and nicotine products, we can't make conclusions whether they learned something new about nicotine products and their harmful effects. But overall results are positive.

**Did you learn anything new regarding oral health today?**

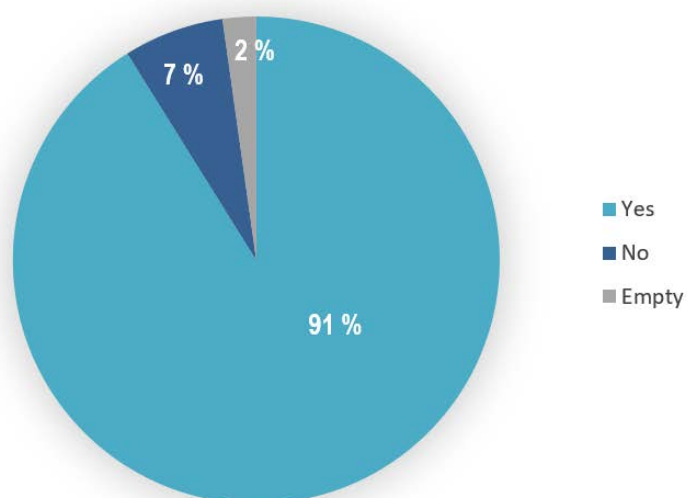


FIGURE 4. Pupil's learning after the lecture, n=45

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### Metatiedot

**Nimeke:** Oral Health Promotion

**Tekijä:** Jussila Aino-Liisa; Oinonen Meeri (toim.)

**Aihe, asiasanat:** hampaidenhoito, terveyden edistäminen, dental care, health promotion

**Tiivistelmä:** Nowadays health promotion plays an important role in health care ideology and implementation. It's vital to commit individuals to take an action with their decisions that may concern or have impact on health and wellbeing. This general awareness has also positive impacts on young people's wellbeing.

Dental hygiene students' ability in oral health promotion was practiced in this course of Health Promotion Project by doing literature searches, writing essays, having presentations and peer evaluations. Wide area of young people's oral health promotion was defined as importance of self-care, motivation as a tool for dental hygiene, xylitol and its benefits on oral health, nutritional challenges and their effects on oral health, and effects on smoking and nicotine products on oral health. The event was carried out in Oulu International School in March 2019 and it was part of 9th grade pupils' health education.

The preventive aspect in dental hygienists' work can be seen as an entity by this health promotion project, including planning and collaboration, implementation and evaluation as well as documentation in the form of this publication.

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