

Oral Hygiene and the Use of Fluoride Toothpastes in Adults in Slovenia in 2019

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Abstract

Introduction: We present the results of the »National Oral Health Survey of Adults in Slovenia in 2019«, which for the first time determined the level of oral health care in adults at the national level. The aim of our study was to assess the state of oral health in adults and make recommendations for its promotion. We report in detail the results and findings in relation to oral hygiene and fluoride use. **Methods:** The target population was adults aged 18–74 years. The gender- and age-representative sample comprised 3,200 adults (0.21% of the population in Slovenia). The survey was conducted using the EGOHID questionnaire. The data were weighted by gender, age and education. The results were analysed based on the number and proportion of people in the selected categories according to demographic variables (gender, age, education, living environment) and other variables (frequency of dental cleaning, etc.). The distribution of proportions between different groups (by gender, age, education and living environment) and comparisons were tested using the chi-square (χ^2) test and the CCP test to compare proportions between different groups. **Results:** 71% of adults brushed their teeth regularly (at least twice a day), of which 81% were women and 60% men (χ^2 test=49.879, $p<0.001$; CCP test, $p<0.001$). Only 59% of adults with at least primary education, 68% of adults with secondary education and 82% of adults with at least tertiary education brushed their teeth at least twice a day (χ^2 test=24.965, $p<0.001$), but only compared to adults with at least tertiary education (CCP test, $p<0.001$). In rural areas, where 62% of adults regularly brushed their teeth, the proportion was lower than among adults in urban (78%) or suburban areas (76%) (χ^2 test=26.466, $p<0.001$; CCP test, $p<0.004$). Most adults used toothpaste when brushing their teeth. Of these, 64% used toothpaste with fluoride, 14% used toothpaste without fluoride and 23% did not know whether their toothpaste contained fluoride. Dental floss was used regularly or

occasionally by 64% of adults, an interdental brush was used regularly or occasionally by 52% of adults, and a tongue scraper was used regularly or occasionally by 23% of adults. Further statistical data are included in the paper. *Discussion and conclusions:* Brushing teeth at least twice daily with fluoride toothpaste and interdental brushing and/or flossing and tongue scraping once daily are recommended as effective measures to prevent oral disease. There is also a need to raise awareness of the importance of dental hygiene among the target population in terms of age, education and living environment. The results and recommendations for improving oral health are a step towards reducing the burden of oral diseases and costs in the (dental) healthcare system.

Keywords: oral health, adults, oral hygiene, fluorides

Introduction

Oral health is an integral part of general health and has a significant impact on the quality of life of individuals and society. Like other aspects of health, oral health is determined by the individual, social and physical environment (WHO, 2024).

In Slovenia, we are following the trend of establishing a system for monitoring oral health indicators. With the results of the »National Oral Health Survey of Adults in Slovenia in 2019«, the level of oral health care among adults at national level was determined for the first time. The aim of our study was to assess the state of oral health in adults and make recommendations for its promotion.

In this article, we report in detail on the results and findings in relation to oral hygiene, fluoride use and the use of (other) aids to maintain oral hygiene.

Methods

The study was designed as a cross-sectional epidemiological survey of the Health Interview Survey (HIS) type and was conducted according to the results of a pilot verification study (Šket, 2015). The study was conducted in spring 2019 on a representative sample of the general population aged 18–74 years, which included 3,200 adults (0.21% of the population in Slovenia).

The survey was conducted using the EGOHID questionnaire (Bourgeois et al., 2008). The adults included in the study received an invitation to participate in the survey at a home address with a password to access the online questionnaire. For participants over 44 years of age, a written questionnaire was enclosed with the notification letter. Participants received a further postal reminder during the survey period.

In our study, we analysed the frequency of tooth cleaning. When analysing, we combined the categories »brushing teeth twice or several times a day« and the categories »once a day«, »several times a week«, »once a week« and »never«, as regular tooth brushing means that teeth are brushed at least twice a

day. We also asked whether respondents used toothpaste and, if so, whether it contained fluoride. We also investigated the use of other aids to maintain oral hygiene; we analysed how often adults in Slovenia use dental floss, an interdental brush and a tongue scraper.

The results were analysed based on the number and proportion of people in the selected categories according to demographic variables (gender, age, education, living environment) and other variables necessary for research or planning further interventions (frequency of tooth cleaning, etc.).

The data obtained in the study were weighted by gender, age and education, taking into account age groups of one year. The sample- and population-weighted data were analysed using the computer programme IBM SPSS Statistics for Windows, version 21.0 (IBM, 2020) and the programme R, version 3.6.0 (n.d.).

The distributions of proportions between different groups (by gender, age, education and living environment) were tested using the chi-square (χ^2) test and the CCP test (Column Comparison Proportion test) to compare the proportions between different groups. A confidence interval of 95% was used in both cases.

Results

Frequency of Tooth Brushing

The results showed that 71% of adults brushed their teeth regularly (at least twice a day) (Figure 1).

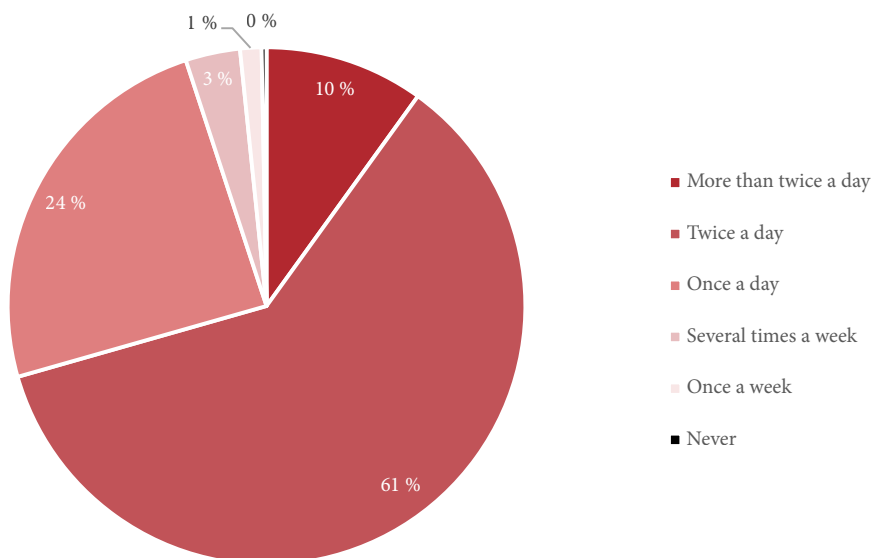


Figure 1: Proportion of adults aged 18–74 years by frequency of tooth brushing.

Broken down by gender, 81% of women and 60% of men brushed their teeth regularly (Figure 2); the differences between the proportions by gender were statistically significant (χ^2 test=49.879, $p<0.001$; CCP test, $p<0.001$).

In terms of age, the proportion of 25- to 34-year-olds stands out: 84% of people brushed their teeth regularly (Figure 2); the differences between the proportions by age were statistically significant (χ^2 test=17.307, $p=0.004$), but only for the proportions in this age group compared to adults over 44 years of age (CCP test, $p<0.05$).

It can be seen that the proportion of people who brushed their teeth regularly (at least twice a day) increased with the level of education (Figure 2). Only 59% of adults with at least primary education, 68% of adults with secondary education and 82% of adults with at least tertiary education brushed their teeth at least twice a day; the differences between the proportions according to educational level were statistically significant (χ^2 test=24.965, $p<0.001$), but only in comparison to adults with at least tertiary education (CCP test, $p<0.001$).

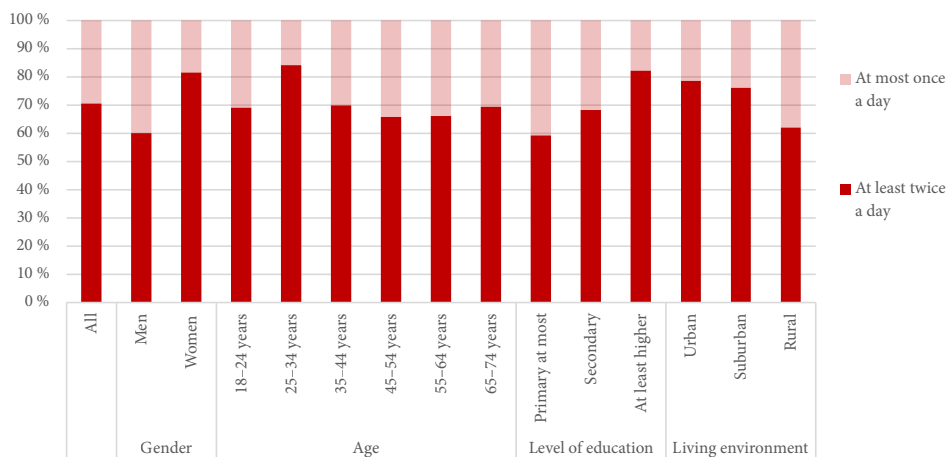


Figure 2: Proportion of adults aged 18–74 years by frequency of tooth brushing, broken down by gender, age, education and living environment.

We also analysed the frequency of tooth brushing in relation to the living environment. In rural areas, where 62% of adults regularly brush their teeth, the proportion was lower than among adults in urban (78%) or suburban areas (76%) (Figure 2); the differences between the proportions according to living environment were statistically significant (χ^2 test=26.466, $p<0.001$; CCP test, $p<0.004$).

Use of Fluoride Toothpaste

Most adults aged 18–74 years (98%) used toothpaste when brushing their teeth. Of these, 64% used toothpaste with fluoride, 14% used toothpaste without fluoride and 23% did not know whether their toothpaste contained fluoride (Figure 3).

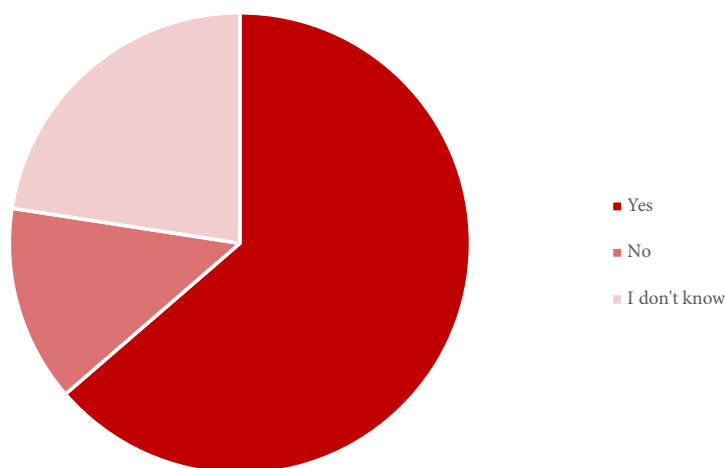


Figure 3: Proportion of adults aged 18–74 years who use fluoride toothpaste.

The use of fluoride toothpaste was higher among adults with higher education. Fluoride toothpaste was used by a greater proportion of people with at least a high school education (70%) than people with a secondary school education (63%) or primary school education or less (56%); the differences in proportions by education were statistically significant (χ^2 test=12.399, $p=0.015$).

The differences between the proportions according to the use of fluoride-containing toothpaste by gender, age and living environment were not statistically significant.

Use of (Other) Oral Hygiene Aids

Use of dental floss. We found that 36% of respondents did not use dental floss. The proportions of people by frequency of dental floss use, broken down by gender, education and living environment, are shown in Table 1.

The differences between the proportions by gender were statistically significant (χ^2 test=29.815, $p<0.001$). By age, the proportion of those who flossed was lowest among adults aged 45 years and older at 60%, lower than among younger adults aged 44 years or less, 70% of whom flossed; the differences between the two proportions by age were statistically significant (χ^2 test=30.434, $p=0.001$). The frequency of flossing was higher among people with higher levels of education (Table 1); the differences between the proportions were statistically significantly greater among people with at least higher education

Table 1: Frequency of dental floss use in adults aged 18–74 years by gender, education and living environment.

		Use of dental floss		
		Yes (regularly)	Occasionally	No
All		17%	47%	36%
Gender	Men	13%	42%	45%
	Women	21%	52%	27%
Level of education	Primary at most	9%	34%	58%
	Secondary	15%	46%	39%
	At least higher	24%	55%	20%
Living environment	Urban	19%	52%	29%
	Suburban	24%	45%	31%
	Rural	12%	44%	44%

(χ^2 test=47.649, $p<0.001$; CCP test, $p<0.006$). Flossing also depended on the living environment (Table 1); the proportion of people in rural areas who did not floss was statistically significantly higher than those in urban or suburban areas (χ^2 test=24.116, $p<0.001$; CCP test, $p<0.018$).

Use of interdental brushes. Among adults aged 18–74 years, 48% of adults did not use an interdental brush. The proportions of people by frequency of interdental brush use by gender and age are shown in Table 2.

Table 2: Frequency of interdental brush use in adults aged 18–74 years by gender and age.

		Use of interdental brushes		
		Yes (regularly)	Occasionally	No
All		23%	29%	48%
Gender	Men	23%	23%	54%
	Women	23%	36%	41%
Age (years)	18–24	12%	28%	61%
	25–34	12%	28%	60%
	35–44	16%	39%	46%
	45–54	21%	29%	50%
	55–64	43%	23%	34%
	65–74	36%	23%	41%

With regard to gender, the differences between the proportions who did not use an interdental brush were statistically significantly lower in women than in men (χ^2 test=16.124, $p<0.001$; CCP test, $p<0.001$). In terms of age, a greater proportion of adults aged 55 years or older used an interdental brush

regularly or occasionally, just over 60% of people, than adults aged 54 years or younger, where half or even a smaller proportion of people used an interdental brush; the differences between the proportions were statistically significant (χ^2 test=68.444, $p<0.001$, CCP test, $p<0.031$). The differences between the proportions with regard to the use of an interdental brush, education and living environment were not statistically significant.

Use of a tongue scraper. Among adults aged 18–74 years, a tongue scraper was not used by 74% of adults. The proportions of people who frequently use a tongue scraper by gender, education and living environment are shown in Table 3.

Table 3: Frequency of tongue scraper use in adults aged 18–74 years by gender, education and living environment.

		Use of a tongue scraper		
		Yes (regularly)	Occasionally	No
All		8%	18%	74%
Gender	Men	6%	16%	78%
	Women	10%	21%	70%
Level of education	Primary at most	0%	12%	88%
	Secondary	8%	20%	72%
	At least higher	10%	17%	73%
Living environment	Urban	11%	24%	65%
	Suburban	8%	16%	76%
	Rural	5%	15%	81%

The differences between the proportions of tongue scraper use by gender were not statistically significant. Regarding age, a greater proportion of younger adults aged 18 to 44 years used a tongue scraper regularly or occasionally, about one-third, compared with people aged 45 to 74 years, of whom only about one-fifth used a tongue scraper; the differences between the proportions in the different age groups were statistically significant (χ^2 test=21.866, $p=0.016$). The differences between the proportions depending on the education of the persons were statistically significant (χ^2 test=12.297, $p=0.015$). A higher proportion of people with a higher level of education used a tongue scraper regularly or occasionally than people with a lower level of education (CCP test, $p<0.05$ or $p<0.001$). With regard to the living environment, the differences between the proportions were statistically significant (χ^2 test=16.677, $p=0.002$). A greater proportion of adults from an urban environment regularly used a tongue scraper than those from a suburban or rural environment (CCP test, $p<0.05$).

Discussion

Frequency of Tooth Brushing

The results of our 2019 study show relatively poor oral hygiene among adults aged 18–74 years in Slovenia, but the percentage of adults who brush their teeth regularly is similar or even slightly higher than the results of the 2016 study (Ranfl and Oikonomidis, 2018), which showed that 64% of adults aged 25–74 years in Slovenia brush their teeth regularly (at least twice a day). The results of that study also showed that adequate oral hygiene is related to the level of education of the population. The proportion of adults who brushed their teeth regularly was lowest among those with primary education (49%) and highest among adults with at least higher education (77%). The proportion of adults who brushed their teeth regularly was higher in urban areas (71%) and lower in rural areas (56%). Compared to our study, the results of our survey also show a slightly higher proportion of people with higher education compared to people with lower education (high school or less) and of people from urban and sub-urban environments compared to people from rural environment.

According to a 2014 national opinion survey by Delta Dental, 31% of Americans do not brush their teeth regularly, which is comparable to the results of our survey; 29% of adults between the ages of 18 and 74 do not brush their teeth regularly.

Use of Fluoride Toothpaste

It is possible that the information we received about the fluoride content of toothpaste was not reliable and that people do not know if they are using fluoride toothpaste. Nevertheless, based on the research results, we can estimate that 80% of people use fluoride toothpaste and 20% of people use toothpaste without fluoride.

Use of (Other) Oral Hygiene Aids

Dental floss is used regularly or occasionally by a larger proportion of women and people with at least a higher level of education. A third of people under 45 and slightly less than half of people aged between 45 and 74 did not use dental floss. The proportion of people who did not floss was highest in rural areas, where it was statistically significantly higher than in urban or suburban areas.

According to NHANES (National Health and Nutrition Examination Survey), 2011–2014 (CDC, 2020a; CDC, 2020b), 32% of adults, 26% of men and 37% of women in the US population aged 30 years and older floss daily, and 32% of adults do not floss (Fleming et al., 2018). According to a national survey by Delta Dental (2014), 20% of Americans do not floss. The two estimates differ due to different methodological approaches. Both studies and our research results show that women floss more frequently than men. The research results are surprising because according to the most recent data (Fleming et al., 2018), as

many as 68% of American adults aged 30 years or older do not floss as recommended. In Slovenia, according to the data from our study, this figure is 83% of adults between the ages of 18 and 74.

The results of our study show that a larger proportion of women and 55–74 year olds use interdental brush. The use of interdental brush was not dependent on education or living environment. We also found that a larger proportion of women, younger adults aged 18–44 years, people with higher levels of education and people from urban areas used the tongue scraper regularly or occasionally. Prevalence studies on the use of dental care appliances are very rare, and to our knowledge there are no studies that can be compared with our studies on the use of interdental brushes and tongue scrapers.

Conclusions

Effective measures to prevent dental disease include tooth brushing at least twice a day for at least two minutes with fluoride toothpaste, brushing once a day with interdental brushes and/or dental floss and tongue scraping once a day. It is also important to sensitise the target population to the importance of dental hygiene, depending on age, education and living environment.

The results of our study are a step towards reducing the burden of dental and oral diseases and costs in the (dental) health care system. An important challenge for the future is the continuous monitoring of oral health and the dental healthcare system in Slovenia based on oral health indicators in accordance with international recommendations, which will facilitate the planning of appropriate and effective programmes to improve oral health. We should promote activities to improve oral health and raise awareness of the importance of oral health in the lives of individuals. Oral health is an important part of general health and has been shown to contribute to a better quality of life.

The results and recommendations to improve oral health are a step towards reducing the burden of oral diseases and costs in the (dental) healthcare system.

Acknowledgements

The research was supported by the Slovenian Research Agency (research core funding No. P3-0429, Slovenian Research Programme for Comprehensive Cancer Control SLORApr and No. V3-1715, Analysis of Oral Health Indicators and Oral Health Promotion of Slovene Population).

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