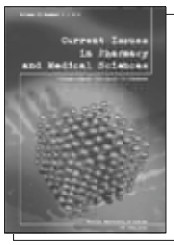

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Effect of dental hygiene procedures on the state of dental hard tissues in women over 45 years of age

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ABSTRACT

Dental caries and periodontal diseases depend on the interaction of four factors: bacteria, substrate, medium and time. Thanks to proper dental hygiene procedures, some of these can be eliminated. The aim of the present study was to determine the effect of oral hygiene procedures on the state of dental and periodontal hard tissues expressed using the DEF index, API and CPITN. In the population examined, we observed statistically significant (or close to being statistically significant) correlations between the parameters of oral cavity health and answers provided by respondents in the questionnaire. The oral hygiene procedures have a relevant impact on the state of dental and periodontal hard tissues, and affect the API, as well as DEF index in women over the age of 45.

Keywords: oral hygiene, dental hygiene procedures, menopause

INTRODUCTION

Dental caries is the commonest disease of the masticatory system**.** It is an infectious disease caused by extrasomatic factors. The pathological process involves demineralization and proteolytic breakdown of the hard tissues of a tooth susceptible to this disease. Dental caries is initiated once four factors act simultaneously, i.e. bacteria, substrate, medium and time [8].

The periodontal diseases are promoted by poor oral hygiene. The dental plaque depositing in the periodontal region constantly irritates this area, inducing chronic inflammatory conditions. These are likely to lead to irreversible structural changes of the alveolar processes of jawbones in the form of vertical or horizontal atrophy. Proper hygiene practices help to eliminate the majority of factors responsible for the development of dental caries and periodontal diseases.

The oral cavity, like the internal organs, e.g. the heart or liver, is interrelated with the functioning of the entire body. Therefore, changes in the body may be reflected in the oral cavity health. Examples of such effects are the changes in the endocrine glands (e.g. in the pancreas – insulin, ovaries – estrogen and progesterone) [1].

Menopause is the final physiological menstruation and usually affects women over the age of 45. It results from gradually progressing ovarian insufficiency. This leads to the loss of production of endogenous estrogen. Menopause is commonly associated with pain, gingivitis, burning sensations, taste changes and oral dryness. Moreover, some drugs used in hormone replacement therapy may promote the development of oral diseases in menopausal women. After menopause, the risk of osteoporosis is higher, which is likely to lead to the loss of alveolar bones and teeth [9].

The aim of the study was to determine the effect of oral hygiene procedures, e.g. frequency and duration of tooth brushing, kinds of toothbrushes, methods of tooth brushing and additional oral hygiene measures, on the state of dental and periodontal hard tissues expressed using the DEF index, API and CPITN.

MATERIAL AND METHODS

The questionnaire study, clinical examinations and statistical analyses were performed amongst 112 women, aged 45-74, patients of the Department of Conservative Dentistry, Medical University of Lublin. The questionnaire involved the frequency of dental check-ups, types of toothbrushes and toothpastes used, methods of tooth brushing and additional oral hygiene measures. The clinical examinations were performed using a dental mirror, probe and calibrated probe WHO 621 under artificial light. Based on the findings, the mean values of DEF index, API and CPITN were determined; moreover, the degree of oral mucosa moisture was tested using the mirror test (MT). The results were statistically analysed.

RESULTS

In the group of 112 women, only 4 (3.57%) attend check-ups every 3 months, 17 (15.17%) – every 6 months and 30 (26.78%) – once a year. The remaining 61 (54.46%)

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women have rarer check-ups or visit their dentist only when with toothache.

The answers concerning tooth brushing movements show that 27.68% of the respondents make circular movements, 26.79% – scrubbing movements, 12.50% – sweeping movements, whereas 33.04% made chaotic movements. Soft toothbrushes are used by 19.64%, medium by 68.75%, and hard by 10.71% of the respondents. Only one respondent uses an electric toothbrush.

Moreover, all the respondents use various chemical agents for dental plaque removal, e.g. fluoride toothpastes (63.39%), toothpastes for sensitive teeth (12.50%), those for prevention of gingival bleeding (15.18%) and herbal toothpastes (8.93%). Besides toothpastes, 24 respondents (21.43%) declare regular use of mouthwashes, 26 (23.21%) made use of toothpicks, whereas 29 (25.89%) employed dental floss. Only one woman in the study population uses a special one-bundle toothbrush. Furthermore, 44.64% (50 respondents) do not use any additional oral hygiene measures; more than 40% (45 respondents) use one of the listed measures while 15% (17) uses at least two additional measures.

The mean age of respondents was 58.6 years. The number of teeth present in the oral cavity ranged from 0 to 29 – 16.56, on average. The findings showed that the mean DEF index was 24.79 (range 11–32), of API 63% (11% to 100%), and the number of interdental spaces examined ranged from 0 to 26 (10.62, on average). The mean value of the consumer price index (CPI) was 1.96, whereas that of TN was 1.66. Proper mucosa moisture determined using the MT was found in 50 women (44.6%), a slight resistance on sliding the mirror along the buccal mucosa was felt in 39 women (34.9%), and marked resistance, i.e. insufficient mucosa moisture, was observed in 23 women (20.5%).

The degree of oral mucosa moisture was analysed according to age. The population was divided into 3 age groups: I – 45–54 years, II – 55–64 and III – over 65 years of age. No statistically significant intergroup differences were found in the oral mucosa moisture ($\chi^2 = 3.98$; p=0.4). Moreover, there were no statistically significant intergroup differences in the mean value of DEF index, API and CPITN. The statistical analysis also involved correlations between the degree of oral mucosa moisture and the parameters of the masticatory system. There were no statistically significant differences in the mean values of API (H=2.77; p=0.25) and CPITN (p=0.27; p=0.24). However, a statistically significant relation between the mean DEF index and oral mucosa moisture was observed (H=7.07; p=0.03) (table 1). The highest mean DEF index was found in the group with the lowest moisture of oral mucosa.

In the population studied, statistically significant or close to being statistically significant correlations were found between the parameters of oral health and questionnaire answers provided by the respondents. A statistically significant relation was observed between the frequency of dental check-ups and the mean DEF index (H=10.82; p= 0.03), as well as API (H=14.83; p=0.005) (table 2).

Table 1. Correlation between the mean DEF index and oral mucosa moisture

Mirror test	DEF index						Statistical analysis
	Mean	Standard deviation	Median	Lower quartile	Upper quartile	Range (min. –max.)	
No resistance	24.02	4.31	24.5	20	27	15-32	H=7.07 p=0.03
Slight resistance	24.67	5.43	25	22	29	12-32	
Marked resistance	26.69	2.49	26	25	28	20-32	

Table 2. Effects of frequency of dental check-ups on DEF index and API

Frequency of check-ups	DEF index			API (in %)		
	Mean	Median	Range (min. –max.)	Mean	Median	Range (min. –max.)
Every 3 months	21	20.50	15-28	47.49	46.78	25-71.4
Every 6 months	24.6	25	18-32	44.37	43.75	14.2-81.8
Once a year	23.9	24.5	14-31	60.16	58.57	12.05.100
Once every 2 years	23.3	22	15-32	68.2	63.63	30-100
Only with toothache	26.2	26	1.12.1932	72.88	80.76	11.11.100
Statistical analysis	H=10.82 ; p=0.03			H=14.83 ; p=0.005		

Furthermore, a statistically significant relation was demonstrated between the mean value of API and types of movements made during tooth brushing, as well as kinds of toothpastes used (H=11.09, p=0.01 for methods of tooth brushing and H=10.77, p=0.01 for the toothbrushes used (table 3). A close to being statistically significant correlation was determined between the kinds of toothbrushes used and DEF index (H=6.73; p=0.08) (table 4).

Table 3. Effects of tooth brushing movements and toothpastes on API in the study population

Tooth brushing movements	API (in %)		Toothpaste	API (in %)	
	Mean	Median		Mean	Median
Circular	59.9	65	Prophylactic fluoride	67.16	63.95
Scrubbing	74.65	76.78	Therapeutic – increased dentine sensitivity	65.58	66.66
Sweeping	46.13	41.05	Therapeutic – periodontal diseases	43.02	41.42
Chaotic	63.42	61.11	Other (herbal, whitening)	66.8	76.47
Statistical analysis	H=11.09 p=0.01		Statistical analysis	H=10.77 p=0.01	

Table 4. Relation between DEF index and kinds of toothbrushes used in the study population

Kinds of toothbrushes	DEF index						Statistical analysis
	Mean	Standard deviation	Median	Lower quartile	Upper quartile	Range (min. –max.)	
1 – soft	22.77	4.45	23.5	20	26	15-32	
2 – medium	25.15	4.45	25	23	28	12-32	H=10.83
3 – hard	26.41	4,5	27	23.5	30	18-32	p=0.03
4 – electric	22	-	22	-	-	22	

Moreover, the values of masticatory parameters were analysed according to additional oral hygiene measures used, dividing the population into groups applying one, two or more various extra measures or none of them. No statistically significant relations were found between the use of

more additional oral hygiene measures and parameters of the masticatory system. This could indicate better oral condition within patients using two or more hygienic measures (p=0.8 for CPITN, p=0.4 for API, p=0.96 for DEF index).

The analysis of individual special oral hygiene measures (dental floss, mouthwashes, toothpicks, special toothbrushes) revealed a close to being statistically significant correlation between regular dental flossing and lower values of API. In the group of respondents not using dental floss, the mean value of API was 66.03% (median=65.83%), whereas among those applying dental flossing regularly – 55.72% (median =48.53%).

DISCUSSION

Climacterium (menopause) is a physiological life process affecting every woman. It is the stage of transition from sexual maturity to senility, which is divided in pre-, peri- and postmenopausal periods. According to the WHO definition of 1996, menopause is the final menstrual period, followed by 12-month amenorrhea, for which there is no other pathological cause [12]. Menopause and the climacteric period are associated with the loss ovarian follicular activity and decreased levels of estrogen. This leads to the development of vasomotor prolapse symptoms, urogenital atrophy, urologic disturbances, cardiovascular diseases and osteoporosis [3]. Moreover, menopause is associated with symptoms regarding the oral cavity described by many authors, such as dryness, discomfort, burning sensations, mucosal atrophy, osteoporosis of alveolar bones and higher incidences of periodontitis [2, 11].

In our study, insufficient oral mucosa moisture was demonstrated in over 50% of the women. Who were subjects of this research. According to Kaczmarek, insufficient moisture is caused by decreased production of resting and stimulated saliva during that period of life [4]. Increased symptoms in postmenopausal patients can be induced by atrophic changes in the superficial layer of oral mucosal epithelium, which depend on decreases in the estrogen level [5].

Additionally, dryness in the oral cavity can be the factor promoting the foci of dental caries. Our findings confirmed this relation – the highest DEF index was observed in women with lower moisture of the oral mucosa. Many authors stress a relatively high mean DEF index in the groups of women over 45 years of age [7, 10]. In our study, the mean DEF index was found to be 24.79 and was comparable to the value reported in literature for this age group.

The available literature contains only a few studies directly discussing the effects of oral hygiene procedures on the parameters of the masticatory system in postmenopausal women.

However, Machuca et al. studied the effect of frequency of check-ups and regular tooth brushing on the amount of dental plaque expressed by PI. The authors found significantly higher values of PI in patients brushing their teeth less frequently and those with irregular dental check-ups [6]. Likewise, our findings demonstrated the correlation between the frequency of dental check-ups and the presence of dental plaque, as well as between dental flossing and lower API. However, the thesis that the higher number of additional oral hygiene measures affects the health of dental and periodontal tissues was not confirmed in our study. The values of parameters did not differ significantly among the groups using different numbers of additional hygiene measures.

CONCLUSIONS

Oral hygiene procedures have a significant impact on the health of dental and periodontal hard tissues in women over the age of 45 and affect API and DEF indexes. Women at this age are at higher risk of new carious foci and periodontitis due to increased incidence of oral dryness and other factors associated with the climacteric period. Therefore, such patients should be provided with special dental care.

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