ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN — POLONIA
VOL. XLVI, 19 SECTIO D 1991

Zakład Stomatologii Zachowawczej. Akademia Medyczna w Lublinie
Kierownik: prof. dr hab. Maria Strużak-Wysokińska

Barbara DROP

Microelement Content in Teeth with and without Caries in People over 50 Years of Age

Zawartość mikroelementów w zębach z próchnicą i bez próchnicy u ludzi po 50 roku życia

The chemical composition of a tooth is determined during its development, however, in the post-developmental period there are possible changes of non-organic elements in its tissues (13). Many changes in dental tissues after their eruption result from the accumulation of elements absorbed by the organism from food, water or environmental and civilizational effects (4, 7, 9—15). Deposition of some elements in the teeth is also caused by ageing of the body (3, 18, 19). Chemical composition, though it is not the only factor playing part in the etiology of hard dental tissues diseases, can considerably affect their occurrence and the course of the pathological process (7, 14).

The study was concerned with examining microelement content in teeth of people over 50 years of age, according to sex, occurrence of dental caries and also with comparing these values with results obtained in the group of permanent teeth of young people under 25 years of age.

MATERIAL AND METHODS

There was carried out an analysis of the following elements: Fe, Cu, Zn and Mg in 89 teeth with dental caries and without it of men and women under 25 and in 73 teeth with and without caries of men and women over 50. The obtained results were statistically analysed. The method and preparation of samples are described in previous papers (16, 17).

RESULTS

Table 1 presents the level of microelements in teeth with and without caries in people over 50 years of age, according to sex. Significantly higher statistical

Table 1. Microelement level in teeth without dental caries in people over 50 years of age, according to sex (Fe, Cu, Zn — μg/g, Mg — %)

Element	Sex	*n*	Range		*M*	*SD*	Statistical characterization	
			min.	max.			*t*	*p*
Fe	M F	14 27	24.20 23.79	97.69 101.90	53.111 47.982	18.853 16.504	0.8759	
Cu	M F	14 27	4.56 4.01	11.69 10.92	7.930 6.770	2.151 1.551	1.93	
Zn	M F	14 27	85.35 155.58	224.25 470.76	147.01 215.21	40.20	−4.012	<0.001
Mg	M F	14 27	0.84 0.87	1.17 1.31	0.974 1.017	0.091 0.096	1.35	

Table 2. Microelement level in teeth according to age (Fe, Cu, Zn — μg/g, Mg — %)

Element	Age years	*n*	Range		*M*	*SD*	Statistical characterization	
			min.	max.			*t*	*p*
Fe	to 25 over 50	20 41	26.35 23.79	112.61 101.90	47.383 50.546	13.55 17.67	−0.694	—
Cu	to 25 over 50	20 41	3.76 4.01	9.51 11.69	6.215 7.35	1.467 1.851	−2.36	<0.05
Zn (M)	to 25 over 50	6 14	97.44 85.35	174.76 224.25	141.70 147.01	30.510 40.20	−0.28	—
Zn (F)	to 25 over 50	14 27	62.35 155.58	281.69 470.76	174.26 215.21	53.21 65.45	−1.97	—
Mg	to 25 over 50	20 40	0.85 0.84	1.14 1.31	1.014 0.955	0.0915 0.0935	2.82	<0.05

Table 3. Microelement level in teeth with and without caries in people over 50 years of age (Fe, Cu, Zn — μg/g, Mg — %)

Element	Caries	*n*	Range		*M*	*SD*	Statistical characterization	
			min.	max.			*t*	*p*
Fe	+ −	32 41	21.83 23.79	104.43 101.90	56.209 49.654	19.718 17.273	1.487	—
Cu	+ −	32 41	2.67 4.01	9.93 11.69	6.39 6.98	1.94 2.12	−1.2377	—
Zn	+ −	32 41	64.85 85.35	554.87 470.76	208.41 192.98	97.92 65.212	0.768	—
Mg	+ −	27 41	0.79 0.84	1.15 1.31	0.988 0.997	0.094 0.092	−0.3897	—

differences were shown in zinc content between the teeth of men and women. Microelement level in teeth according to age is presented in Table 2. Fe, Cu and Zn reveal an increasing tendency in older people, in case of Cu this dependence was statistically significant. Mg level was higher in young people which was also statistically proved. Microelement level in teeth with and without caries in people over 50 is presented in Table 3. There was only little more Fe and Zn in teeth with than in teeth without caries. Cu and Mg level in these teeth was lower. This was not statistically proved. Tables 4—7 present the levels of Fe, Cu, Zn, Mg in teeth with and without caries according to age and sex.

Table 4. Fe level (μg/g) in teeth with caries (+) and without caries (−), according to age and sex

Sex	Age years	Caries	*n*	Range		*M*	*SD*	Statistical characterization	
				min.	max.			*t*	*p*
M	to 25	+	44	30.42	82.84	43.819	9.919	2.709	<0.05
		−	6	44.96	56.25	49.687	3.839		
M	over 50	+	10	34.06	67.74	51.076	11.263	0.304	—
		−	14	24.20	97.69	53.111	18.853		
M	Total	+	54	30.42	82.84	45.286	10.417	−1.946	—
		−	20	24.20	97.69	52.636	15.231		
F	to 25	+	25	18.30	89.83	47.253	19.876	0.308	—
		−	14	26.35	112.61	45.080	23.264		
F	over 50	+	22	21.83	104.43	59.980	25.423	1.910	<0.07
		−	27	23.79	101.90	47.982	16.504		
F	Total	+	47	18.30	104.43	53.217	23.028	1.416	—
		−	41	23.79	112.61	46.989	18.606		

Table 5. Cu level (μg/g) in teeth with caries (+) and without caries (−), according to age and sex

Sex	Age years	Caries	*n*	Range		*M*	*SD*	Statistical characterization	
				min.	max.			*t*	*p*
M	to 25	+	44	3.05	8.34	5.295	1.231	1.029	—
		−	6	4.79	9.57	6.957	1.880		
M	over 50	+	10	5.18	9.93	6.704	1.483	−1.491	—
		−	14	4.56	11.69	7.930	2.151		
M	Total	+	54	3.05	9.93	5.555	1.368	−4.162	<0.001
		−	20	4.56	11.69	7.638	2.022		
F	to 25	+	25	3.05	8.48	5.736	1.384	0.599	—
		−	14	3.76	7.21	5.474	1.054		
F	over 50	+	22	2.67	9.93	6.260	2.164	−0.907	—
		−	27	4.01	10.92	6.770	1.551		
F	Total	+	47	2.67	9.93	5.981	1.771	−0.983	—
		−	41	3.76	10.92	6.324	1.503		

Table 6. Zn level (μg/g) in teeth with caries (+) and without caries (−), according to age and sex

Sex	Age years	Caries	*n*	Range		*M*	*SD*	Statistical characterization	
				min.	max.			*t*	*p*
M	to 25	+	44	38.69	592.96	171.15	100.51	1.435	—
		−	6	97.44	174.76	141.70	30.51		
M	over 50	+	10	64.85	263.67	183.06	61.21	1.666	—
		−	14	85.35	224.25	147.01	40.20		
M	Total	+	54	38.69	592.96	173.36	94.473	1.818	—
		−	20	85.35	224.25	145.418	35.903		
F	to 25	+	25	80.73	390.23	184.78	76.31	0.445	—
		−	14	62.35	281.69	174.26	53.31		
F	over 50	+	22	110.62	554.87	224.36	114.40	0.182	—
		−	27	155.58	470.76	215.21	65.45		
F	Total	+	47	80.73	554.87	203.307	98.428	0.119	—
		−	41	62.35	470.76	201.226	63.202		

Table 7. Mg level (%) in teeth with caries (+) and without caries (−), according to age and sex

Sex	Age years	Caries	*n*	Range		*M*	*SD*	Statistical characterization	
				min.	max.			*t*	*p*
M	to 25	+	43	0.89	1.21	1.018	0.096	0.319	—
		−	6	0.85	1.14	1.032	0.115		
M	over 50	+	10	0.80	1.13	0.975	0.110	0.0233	—
		−	14	0.84	1.17	0.974	0.091		
M	Total	+	53	0.80	1.21	0.996	0.098	0.1927	—
		−	20	0.84	1.17	0.991	0.096		
F	to 25	+	15	0.80	1.15	1.019	0.023	0.700	—
		−	13	0.89	1.10	0.997	0.068		
F	over 50	+	17	0.79	1.15	1.004	0.084	0.0431	—
		−	27	0.87	1.31	1.017	0.096		
F	Total	+	32	0.79	1.15	1.011	0.079	0.3093	—
		−	40	0.89	1.31	1.017	0.085		

DISCUSSION

In available literature the author has not come across any papers giving results of examinations of microelement content in teeth with and without caries in people over 50 years of age. In my examinations there were no statistically significant differences in microelement content according to sex. Only zinc

showed such a correlation which is also confirmed by the study of Derise et al. (6).

In the teeth of older people there was shown an increase of microelement content, especially Fe, Cu and Zn. It was only the amount of Mg that slightly decreased in the group of examined persons over 50. Results suggesting an increase of microelements with age are also given by other authors (6, 7, 19, 11).

Little are differences in microelement content in teeth with and without caries of people over 50. The level of iron and zinc was higher in the teeth with caries, while the level of copper and magnesium in these teeth was lower. This was not statistically proved. There are few reports and papers giving results of microelements examinations in the process of dental caries (1, 2, 4, 5, 7, 8, 16, 17). These examinations are carried out on different materials and with different analytical methods. This inconsistency and lack of concrete models do not allow drawing conclusions as to the role of individual elements in the process of dental caries.

REFERENCES

1. Anderson R. J. et al.: Dental Caries Prevalence in a Heavy Metal Contanated Area of the West England. Brit Dent. J. **141**, 311, 1976.
2. Brown E. D. et al.: An Effect of Zinc Deficiency on Dental Caries. Life Sci. **24/22**, 2093, 1979.
3. Bürger M.: Biomorfoza i jej znaczenie w procesach starzenia się i w stanach chorobowych. PZWL, Warszawa 1965.
4. Curzon M. E. Losse F. L.: Dental Caries and Trace Element Composition of Whole Human Enamel: Easter U.S. J. Am. Dent. Assoc. **94**, 1146, 1977.
5. Curzon M. E., Crocker D. C.: Relationships of Trace Elements in Human Teeth Enamel to Dental Caries. Arch. Oral. Biol. **23/8**, 647, 1978.
6. Derise N. L., Ritchey S. J.: Mineral Composition of Normal Human Enamel and Dentin and the Relation of Composition to Dental Caries. J. Dent. Res. **53**, 853, 1974.
7. Drop B.: Zawartość mikroelementów w tkankach zębów z próchnicą i bez próchnicy. Praca doktorska. Lublin 1980.
8. Fetkowska-Mielnik K.: Rola pierwiastków śladowych w badaniach próchnicy zębów. Stomat. materiały i prace naukowe. I, PZWL, Warszawa 1965.
9. Kabata-Pendias A., Pendias H.: Pierwiastki śladowe w środowisku biologicznym. Wydawn. Geolog. Warszawa 1979.
10. Kot I.: Badanie zawartości składników mineralnych w twardych tkankach zębów u ludzi w różnym wieku. Praca doktorska, Lublin 1984.
11. Lakomaa E. L., Rytöma J: Mineral Composition of Enamel and Dentin of Primary and Permanent Teeth in Finland. Scand. J. Dent. Res. **85**, 89, 1977.
12. Lappalainen R. et al.: Arch. Oral. Biol. **26** (1) 1, 1971.
13. Losee F. L. et al.: Natural Elements of the Periodic Table in Human Dental Enamel. Caries Res. **8**, 123, 1974.
14. Obersztyn A.: Próchnica zębów i jej zapobieganie. PZWL, Warszawa 1982.
15. Stack M. V., Burkitt A. J., Nicless G.: Abstracts J.A.D.R. **106**, J. Dent. Res. 1975.
16. Strużak-Wysokińska M. et al.: Zawartość miedzi w zębach z próchnicą i bez próchnicy. Czas. Stomat. **5—6**, 273, 1982.

17. Strużak-Wysokińska M. et al.: Zawartość żelaza w zębach z próchnicą i bez próchnicy. Czas Stomat. **11**, 733, 1982.
18. Wiśniewska-Roszkowska K.: Geriatria. PZWL, Warszawa 1971.
19. Wiśniewska-Roszkowska K., Zgierski A.: Starość, metabolizm, rewitalizacja. PZWL, Warszawa 1973.

Otrzymano 1991.07.31.

STRESZCZENIE

Zbadano zawartość Fe, Cu, Zn i Mg w zębach z próchnicą i bez próchnicy u ludzi po 50 roku życia, a następnie porównano uzyskane wartości z wynikami w grupie takich samych zębów u ludzi młodych, do 25 roku życia. Poziom badanych pierwiastków nie wzrastał w zależności od płci, jedynie Zn wykazał taką tendencję. Zawartość mikropierwiastków zwiększała się wraz z wiekiem, ale ilość Mg była wyższa u ludzi młodych. W zębach z próchnicą u ludzi po 50 roku życia wzrastała zawartość Fe i Zn, natomiast malał poziom Cu i Mg.