

Renata Chałas

Procjena oralne higijene kod pacijenta s multiplom sklerozom

Assessment of Oral Hygiene of Patients with Multiple Sclerosis

Zavod za konzervativnu stomatologiju Medicinskog fakulteta u Lublinu, Poljska
Department of Conservative Dentistry, Medical University of Lublin, Poland

Sažetak

Svrha rada bila je procijeniti oralnu higijenu pacijenata s multiplom sklerozom. **Matijerijski i postupak:** Ispitano je 86 bolesnika s multiplom sklerozom (MS-om) i 54 zdrave osobe. Stanje oralne higijene ocijenjeno je indeksom OHI-S u skladu s Greenom i Vermillionom te ograničeno samo na plak. Dobiveni podaci statistički su analizirani testom Hi-kvadrat. **Rezultati:** Dobiveni rezultati pokazali su da je 44,2 posto pacijenata s multiplom sklerozom i 54,2 posto zdravih osoba imalo dobru oralnu higijenu. Srednja vrijednost indeksa OHI-S bila je 1,29 za skupinu s MS-om i 1,08 za kontrolnu. **Zaključak:** Visoke vrijednosti indeksa OHI-S kod osoba s MS-om u odnosu prema kontrolnoj skupini pokazale su lošije stanje oralne higijene kod pacijenata sa sustavnom bolešću.

Zaprimljen: 3. listopada 2008.
Prihvaćen: 26. listopada 2008.

Adresa za dopisivanje

Dr. Renata Chałas
Zavod za konzervativnu stomatologiju
Medicinski fakultet, Lublin
7. karmelićka ulica
20-081 Lublin, Poljska
Telefon: 0 048 81 528 79 20
renata.chalas@gmail.com

Ključne riječi

multipla skleroza; oralna higijena,
indeks; zubni plak, indeks

Uvod

Multipla skleroza (*sclerosis multiplex*) – MS, jedna je od uobičajenih bolesti neurološkog sustava, a javlja se uglavnom kod mladeži i ljudi u srednjoj dobi. Češća je kod žena i kod osoba koje žive u područjima s hladnom i umjerenom klimom. Uzrok bolesti još je nepoznat. Postoji mnogo hipoteza, na primjer bakterijska, imunološka, virusna, genetska te utjecaj okoliša, a neurolozima je najprihvatljivija ona autoimunološka, što je odgovor organizma na nepoznati antigen ili odgovor antigenima (1-5).

Higijena je najvažniji čimbenik u prevenciji oralnih bolesti. Oralna higijena uključuje postupke uklanjanja zubnog plaka, jer je godinama poznata uloga plaka u etiopatogenezi karijesa ili parodontne bolesti (6). Danas je četkanje zuba najčešći na-

Introduction

Multiple sclerosis - MS, (*sclerosis multiplex*) is one of the common diseases of the neurological system which appears mainly among young and middle-aged people. It concerns more often women than men, and persons living in countries with cold and temperate climate. The cause of multiple sclerosis is still not clarified. Nowadays many hypothesis are known, for example bacterial, immunological, viral, genetic, environmental, but the most accepted by neurologists is the autoimmunological one, which is the result of the organism response to an unknown antigen or antigens (1-5).

Hygiene is the most significant factor in prevention of oral diseases. Oral hygiene includes the procedures eliminating dental plaque as the role of

čin uklanjanja plaka (7). Djelotvornost tog načina ovisi koliko često i kako četkamo zube, kojom se pastom koristimo, kakvu smo četkicu odabrali te o dodatnim metodama u svakodnevnoj oralnoj higijeni (ispiranje usta vodicama, korištenje zubne svile) (8). Bilo bi idealno kada bi se zubi čistili nakon svakog obroka. Zato pravilni postupci u vezi s oralnom higijenom imaju važan utjecaj kad je riječ o tome kako sačuvati zdrave zube i zubno meso (9). Manualne vještine pacijenata također su važne. Sustavna bolest može biti osnovni čimbenik koji narušava oralnu higijenu. Stanje usne šupljine i zuba la pokazatelj je općega zdravstvenog stanja starijih osoba (10).

Svrha rada bila je procijeniti oralnu higijenu pacijenata s multiplom sklerozom.

Materijali i postupak rada

Kliničko ispitivanje obavljeno je na 140 odraslih sudionika – na 86 pacijenata s multiplom sklerozom i 54 zdrave osobe u kontrolnoj skupini. Struktura njihove dobi, spola i mjesta stanovanja prikazana je u Tablici 1. Klinički stomatološki pregled bio je obavljen sondom i stomatološkim zrcalom, u skladu s preporukama WHO-a. Status oralne higijene bio je ocijenjen zajedničkim pokazateljem - Greenovim i Vermillionovim jednostavnim indeksom oralne higijene ili OHI-S-om. Zubne naslage ocjenjivale su se na odabranim mjestima. Indeks OHI-S bio je bodovan na šest površina šest zuba: bukalnoj /16,26/, labijalnoj /11,31/ i ligvalnoj /36,46/. Bili su primijenjeni sljedeći kriteriji: 0 – bez naslaga; 1 - naslage ne pokrivaju više od 1/3 krune zuba; 2 - naslage do 2/3 krunu i 3 – naslage pokrivaju više od 2/3 krune. Na temelju srednje vrijednosti indeksa OHI-S pacijenti su svrstani u tri skupine prema sljedećim oznakama:

- 0 - ($0 \leq \text{OHI-S} \leq 1$) - dobra oralna higijena
- 1 - ($1,1 \leq \text{OHI-S} \leq 2,0$) - zadovoljavajuća oralna higijena
- 2 - ($2,1 \leq \text{OHI-S} \leq 3,0$) - loša oralna higijena

Vrijednosti indeksa bile su pokazatelji razine oralne higijene.

Dobiveni podaci statistički su obrađeni. Prikazan je bio broj pregledanih osoba (n), raspon vrijednosti (min-maks.), aritmetička sredina (X), standardna devijacija (SD) i koeficijent varijacije (V%). Zbog znatnih osobnih razlika ($V\% > 50,0$) analiza ovisnosti OHI-S-a te spola, dobi i mjesta stanovanja bila

plaque in etiopathogenesis of dental caries or periodontal disease has been known for years (6). Teeth brushing is now the most common method of dental plaque removing (7). The efficacy of this procedure depends on the frequency of tooth brushing, using a toothpaste, method of brushing, kind of a toothbrush and additional methods used in everyday oral hygiene behaviors (mouth rinsing, flossing) (8). Cleaning teeth after every meal would be ideal. Therefore correct pro-healthy behaviors concerning oral hygiene have an important influence on saving healthy teeth and gums (9). The manual skills of patients also have an important role in this procedure. The systemic disease may be a pivotal factor which impairs oral hygiene. The state of the oral cavity and dentition is a reflection of general health condition of the elderly people (10).

The aim of the study was to assess the state of oral hygiene in patients with multiple sclerosis.

Material and methods

Clinical examination was carried out on 140 adult persons – 86 patients with multiple sclerosis and 54 healthy persons as a control group. The structure of age, gender and place of residence of examined persons are shown in Table 1. The clinical dental examination was performed according to WHO directives, using a probe and a dental mirror. The oral hygiene status was evaluated by a common indicator – the Simplicity Oral Hygiene Index (OHI-S) by Green and Vermillion. Dental debris were evaluated in selected places. The OHI-S index was scored on six surfaces of six teeth: buccal (16,26), labial (11,31) and lingual (36,46). The following criteria were applied: 0 – lack of debris, 1- debris covering not more than 1/3 of a tooth crown, 2 – debris up to 2/3 of the crown and 3 – covering more than 2/3 of the crown. On the basis of the mean values of OHI-S index the patients were classified into 3 groups with the following codes:

- Code 0 – ($0 \leq \text{OHI-S} \leq 1$) – good oral hygiene
- Code 1 – ($1,1 \leq \text{OHI-S} \leq 2,0$) – satisfactory oral hygiene
- Code 2 – ($2,1 \leq \text{OHI-S} \leq 3,0$) – bad oral hygiene

The values of the index were the indicators of the oral hygiene level.

The obtained data were statistically analyzed, which has shown: number of examined persons (n), range of values (min-max), arithmetical mean (X), standard deviation (SD) and variation coefficient (V%). Because of the considerable personal variation ($V\% > 50,0$), the analysis of dependences of

je obavljena usporedbom čestoće OHI-S vrijednosti. Statistički znatne razlike dobivene su testom Hi-kvadrat, a vrijednost $p \leq 0,05$ smatra se znatnom.

Rezultati

Srednje vrijednosti indeksa OHI-S kod ispitanice i kontrolne skupine - ovisno o spolu, dobi i okružju - prikazane su u Tablicama od 2 do 4 i u Grafikonu 1. U skupini od 86 pacijenata s MS-om, indeks OHI-S oscilira od 0,0 do 2,66 te mu je srednja vrijednost 1,288. Standardna devijacija iznosila je 0,652 i pokazuje dosta veliku osobnu razliku te značajke kod bolesnika (V% - 50,6). Raspon vrijednosti indeksa OHI-S u kontrolnoj skupini ista je kao i u skupini s MS-om i ima sljedeću srednju vrijednost = 1,078, SD = 0,701 (V% - 65,0).

Na temelju rezultata u Tablicama 3. i 4. možemo uočiti da 44,2 posto bolesnika s MS-om i 53,7 posto zdravih osoba ima dobru oralnu higijenu (oznaka 0). Zapažena razlika bila je potpuno slučajna - $p > 0,27$. U ispitanim skupinama 31,6 posto muškaraca i 54,2 posto žena imalo je oznaku 0 i bila je statistički velika ($p < 0,04$). Nije bilo povezanosti između učestalosti oznake 0 i dobi ili mjesta stanovanja ispitanika.

Dobra oralna higijena u kontrolnoj skupini nije ovisila o dobi, no određeni utjecaj imali su spol i mjesto stanovanja. Dobra oralna higijena u kontrolnoj skupini zabilježena je kod 72,2 posto osoba mlađih od 35 godina (skupina I.), 38,9 posto u dobi od 35 do 44 godina (II. skupina) i 50 posto osoba starijih od 44 godine (III. skupina). Razlika između I. i II. skupine statistički je velika ($P < 0,05$). U kontrolnoj je skupini dobra oralna higijena (kod 0) zabilježena kod 83,3 posto osoba iz gradova, 50 posto iz malih mjesta i samo 27 posto sa sela. Što je okružje bilo manje, to su rjeđe bile vrijednosti s oznakom 0.

Dobra oralna higijena kod bolesnika s MS-om bila je češća kod žena negoli muškaraca. U kontrolnoj skupini najmlađi iz većih okružja imali su bolju oralnu higijenu. Nije bio uočen utjecaj bolesti na učestalost oznake 0.

45,3 posto osoba s MS-om i 35,2 posto zdravih osoba imalo je zadovoljavajuću oralnu higijenu (oznaka 1). Opažena razlika bila je slučajna ($p > 0,23$). 65,8 posto muškaraca i samo 29,2 posto žena iz skupine s MS-om imalo je zadovoljavajuću oralnu higijenu (oznaka 1) i ta je razlika statistički vrlo velika ($P < 0,001$). Nije uočen utjecaj dobi i mje-

OHI-S and gender, age and place of residence was carried out with a comparison of frequency of OHI-S values. The statistical significance of differences was performed using Chi² test. A value of $p \leq 0,05$ was considered to be significant.

Results

The mean values of OHI-S index in the examined and control groups in dependence on gender, age and environment were shown in Tables 2 - 4 and on graph 1. In a group of 86 MS patients the OHI-S index oscillates from 0,0 to 2,66, mean value - 1,288. The standard deviation equals 0,652 and indicates rather considerable personal variation of this trait among patients (V% - 50,6). In the control group the range of values of OHI-S index was the same as in the MS group, with the following values: Mean = 1,078, SD = 0,701 (V% - 65,0).

On the basis of the results which are shown in Tables 3 and 4 we can notice that 44,2% of MS patients and 53,7% of healthy persons perform good oral hygiene (code 0). The observed difference was totally random, $p > 0,27$. In Table 3 cases 31,6% men and 54,2% women have code 0 and this difference was statistically significant ($p < 0,04$). There were not found any relationships between the frequency of code 0 and age or place of residence of examined persons.

In the control group good oral hygiene (code 0) was not dependent on gender while age and place of residence had a certain influence on this state. Good oral hygiene (code 0) in control group was stated in 72,2% people younger than 35 years of age (group I), 38,9% aged 35-44 years (group II) and 50% persons older than 44 years of age (group III). The difference between group I and II is statistically significant ($p < 0,05$). In the control group good oral hygiene (code 0) was stated in 83,3% persons from cities, 50% from small towns and only 27% from villages. The smaller environment, the more rare were values of code 0.

Among MS patients good oral hygiene (code 0) was observed more frequently in women than in men, and in the control group the youngest from the bigger environment have better oral hygiene. The influence of the disease on the frequency of code 0 was not noticed.

45,3% of MS patients and 35,2% of healthy persons have a satisfactory oral hygiene (code 1). The observed difference was random ($p > 0,23$). 65,8% of men and only 29,2% of women from the MS group had a satisfactory oral hygiene (code 1) and this difference was highly statistically significant

Tablica 1. Broj ispitanih osoba ovisno o spolu, dobi i okruženju

Table 1 The number of examined persons in dependence of gender, age and environment.

Čimbenik • Factor	Kategorija • Category of factor	MS pacijenti • MS patients	Zdravi • Healthy
Spol • Gender	muško • male (M)	38	27
	žensko • female (F)	48	27
Dob • Age	< 35 godina • years (I)	35	18
	35 – 44 godina • years (II)	37	18
	> 44 godina • years (III)	14	18
Vanjski faktori • Environment	grad • city (C)	35	18
	manji grad • small town (T)	24	18
	selo • village (V)	27	18
Ukupno • Total		86	54

Tablica 2. Indeks oralne higijene ispitanih skupine s OHI-S-om

Table 2 Oral Hygiene Index OHI-S in examined group.

Skupina • Group	n	min.	max.	\bar{X}	SD	V %
MS pacijenti • MS patients	86	0,0	2,66	1,288	0,652	50,6
Zdravi • Healthy	54	0,0	2,66	1,078	0,701	65,0

Tablica 3. Broj i postotak ispitanih osoba sa srednjom vrijednost indeksa OHI-S, ovisno o spolu, dobi i okruženju

Table 3 Number and percentage of examined persons with mean values of OHI-S index in dependence of gender, age and environment.

Grupa • Group	Čimbenik • Factor	Kategorija • Category of factor	N				%			Ukupno • Total
			n	Code 0	Code 1	Code 2	Code 0	Code 1	Code 2	
MS pacijenti • MS patients	Spol • Gender	M	38	12	25	1	31,6	65,8	2,6	100
		F	48	26	14	8	54,2	29,2	16,6	100
	Dob • Age	I	35	19	12	4	54,3	34,3	11,4	100
		II	37	15	18	4	40,5	48,7	10,8	100
		III	14	4	9	1	28,6	64,3	7,1	100
	Okoliš • Environment	C	35	16	13	6	45,7	37,1	17,2	100
T		24	9	12	3	37,5	50,0	12,5	100	
V		27	13	14	0	48,1	51,9	0,0	100	
Zdravi • Healthy	Spol • Gender	M	27	16	10	1	59,3	37,0	3,7	100
		F	27	13	9	5	48,1	33,3	18,6	100
	Dob • Age	I	18	13	3	2	72,2	16,7	11,1	100
		II	18	7	10	1	38,9	55,6	5,5	100
		III	18	9	6	3	50,0	33,3	16,7	100
	Okoliš • Environment	C	18	15	2	1	83,3	11,1	5,6	100
T		18	9	5	4	50,0	27,8	22,2	100	
V		18	5	12	1	27,8	66,7	5,5	100	
Grupa • Groups	MS pacijenti • MS patients		86	38	39	9	44,2	45,3	10,5	100
	Zdravi • Healthy		54	29	19	6	53,7	35,2	11,1	100

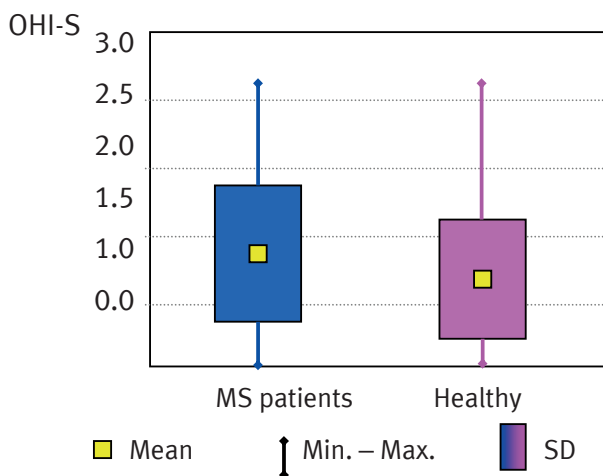
M – muško • Male; F – žensko • Female; C – grad • City; T – manje mjesto • small Town; V – selo • Village; I – < 35 godina • years; II – 35-44 godine • years; III – > 44 godine • years; Oznaka 0 • Code 0 – dobra oralna higijena • good oral hygiene; Oznaka 1 • Code 1 – zadovoljavajuća oralna higijena • satisfactory oral hygiene; Oznaka 2 • Code 2 – loša oralna higijena • bad oral hygiene

Tablica 4. Znatne razlike između učestalosti OHI-S-a u ispitanj skupini, ovisno o spolu, dobi i okruženju

Table 4 Significance of differences between frequencies of OHI-S in examined group in dependence of gender, age and environment.

Grupa • Group	Čimbenik • Factor	Usporedba • Comparisons	Oznaka 0 • Code 0		Oznaka 1 • Code 1		Oznaka 2 • Code 2	
			χ^2	P	χ^2	P	χ^2	P
MS pacijenti • MS patients	Spol • Gender	M – F	4,36	< 0,04	11,48	< 0,001	4,46	< 0,04
		II – I	1,36	> 0,24	1,53	> 0,21	–	–
	Dob • Age	III – II	0,62	> 0,43	1,00	> 0,31	–	–
		III – I	2,65	> 0,10	3,67	≈ 0,06	–	–
	Okoliš • Environment	T – C	0,39	> 0,53	0,96	> 0,32	–	–
		V – T	0,59	> 0,44	0,02	> 0,89	–	–
Zdravi • Healthy	Spol • Gender	M – F	0,67	> 0,41	0,08	> 0,77	–	–
		II – I	4,05	< 0,05	5,90	< 0,02	–	–
	Dob • Age	III – II	0,45	> 0,50	1,80	> 0,17	–	–
		III – I	1,87	> 0,17	1,33	> 0,24	–	–
	Okoliš • Environment	T – C	4,50	< 0,04	–	> 0,20	–	–
		V – T	1,87	> 0,17	5,46	< 0,02	–	–
	V – C	11,25	< 0,001	11,69	< 0,001	–	–	
Grupa • Groups		MS pacijenti Zdravi • MS patients Healthy	1,20	> 0,27	1,41	> 0,23	0,01	> 0,90

M – muško • Male; F – žensko • Female; C – grad • City; T – manje mjesto • small Town; V – selo • Village; I – < 35 godina • years; II – 35-44 godine • years; III – > 44 godine • years; Oznaka 0 • Code 0 – dobra oralna higijena • good oral hygiene; Oznaka 1 • Code 1 – zadovoljavajuća oralna higijena • satisfactory oral hygiene; Oznaka 2 • Code 2 – loša oralna higijena • bad oral hygiene



Slika 1. Srednja vrijednost indeksa OHI-S u ispitanj skupini

Figure 1 Mean values of the OHI-S index in examined groups.

sta stanovanja na učestalost oznake 1 kod bolesnika s MS-om.

Oznaka 1 u kontrolnoj skupini bila je gotovo isto tako česta i kod muškaraca i kod žena. Samo 16,7 posto mlađih od 35 godina i 55,6 posto onih između 35 do 44 godine imalo je zadovoljavajuću oralnu higijenu (oznaka 1). To je znatna razlika ($P < 0,02$). U kontrolnoj skupini je 11,1 posto osoba iz grada, 27,8 posto iz malih mjesta i 66,7 posto sa sela imalo oznaku 1.

10,5 posto sudionika iz skupine s MS-om i 11,1 posto onih iz kontrolne skupine imalo je lošu oralnu higijenu (oznaka 2) - $p < 0,90$. Kako su oznake vri-

($p < 0,001$). The influence of age or place of residence on the frequency of code 1 among MS patients was not noticed.

In the control group the frequency of code 1 was almost the same for men and women. Only 16,7% of persons younger than 35 years of age and 55,6% of persons between 35-44 years of age had a satisfactory oral hygiene (code 1). This difference was significant ($p < 0,02$). In the control group 11,1% of persons from the city, 27,8% from the small town and 66,7% from the village had code 1.

10,5% of the MS group and 11,1% of the control group had bad oral hygiene (code 2) – $p < 0,90$. Be-

jednosti 2 bile rijetke, nije bila provedena analiza znatnosti utjecaja spola, dobi i mjesta stanovanja na učestalost u toj kategoriji.

Rasprava

U mnogim istraživanjima potvrđen je utjecaj dobre oralne higijene na prevenciju karijesa i gingivitis / paradontitisa (11). Istaknuto je da pravilna i svakodnevna sustavna oralna higijena može spriječiti rast čak 50 posto novih karijesnih lezija. Učinkovitost oralne higijene ovisi o mnogo čimbenika: o odgovarajućim proizvodima i opremi za oralnu higijenu, o manualnoj spretnosti pacijenata, o motivaciji i razini pacijentova znanja (12).

Istraživanje je pokazalo da su bolesnici s multiplom sklerozom imali lošiju oralnu higijenu nego zdrave osobe. Indeks OHI-S za skupinu s MS-om bio je 1,29, a za kontrolnu 1,08. Ti rezultati mogu potvrditi pretpostavku da je sustavna bolest uzročnik koji narušava oralnu higijenu. Pacijenti s multiplom sklerozom obično imaju manualne poteškoće, pa im pravilno četkati zube može činiti teškoće. Oni također provode mnogo vremena u bolnicama i tamo vjerojatno nemaju oralnu higijenu tako dobru kao kod kuće. Slična opažanja u vezi s hospitaliziranim pacijentima s MS-om istaknuo je i Longhurst u svojoj studiji (13).

Zaključci

1. Visok indeks OHI-S kod osoba s multiplom sklerozom dokazuje njihovu lošu oralnu higijenu.
2. Potrebno je poboljšati posebnu stomatološku skrb osoba s multiplom sklerozom, ako ne mogu sami pravilno obavljati oralnu higijenu.

cause values of code 2 appeared rarely, the analysis of significant influence of gender, age and place of residence on the frequency of this category was not carried out.

Discussion

Many recent studies confirmed the influence of good oral hygiene on caries and gingivitis/periodontitis prevention (11). It was observed that the correct and systematic everyday oral hygiene procedures can inhibit the growth of 50% new carious lesions. The efficacy of oral hygiene depends on many factors: proper oral hygiene products and equipment, manual skills of patients, suitable motivation and the level of patients' knowledge (12).

The study showed that patients with multiple sclerosis had poorer oral hygiene than healthy people. In MS group the OHI-S index was 1,29 and in the control group it was 1,08. These results may confirm the suggestion that the systemic disease is an agent which impairs oral hygiene. Patients with multiple sclerosis have usually manual problems and proper teeth brushing may be difficult for them. They spend many days in hospitals where they carry out oral hygiene procedures probably not as good as at home. Longhurst also had similar observations connected with the hospitalized patients (13).

Conclusions

1. The high OHI-S index among patients with multiple sclerosis evidences their bad oral hygiene.
2. It is necessary to improve the special dental care of patients with multiple sclerosis who can not properly carry out their oral hygiene procedures.

Abstract

Objective: The aim of the study was to assess the oral hygiene in patients with multiple sclerosis. **Material and Methods:** 86 patients with multiple sclerosis and 54 healthy persons were examined. The state of oral hygiene was evaluated with the use of OHI-S index according to Green and Vermillion limited only to dental plaque. The obtained data were statistically analyzed using Chi-square test. **Results:** Obtained results showed that 44,2 % of patients with multiple sclerosis and 54,2% of healthy persons had good oral hygiene (code 0). The mean value of OHI-S index was 1,29 in MS group and 1,08 in the control group. **Conclusion:** Higher values of OHI-S index among multiple sclerosis cases than in control group indicates poorer oral hygiene status in patients with a systemic disease.

Received: 24. veljače 2006.

Accepted: 10. svibnja 2006.

Address for correspondence

Dr n. med. Renata Chalas
Department of Conservative Dentistry
Medical University of Lublin
7 Karmelicka Street
20-081 Lublin, Poland
Phone: 0 048 81 528 79 20
E-mail: renata.chalas@gmail.com

Key words

Multiple Sclerosis; Oral Hygiene, index; dental plaque, index

References

1. Monteyne P, Bureau JF, Brahic M. Viruses and multiple sclerosis. *Curr Opin Neurol*. 1998;11(4):287-91.
2. Yasui M, Ota K. Experimental and clinical studies on dysregulation of magnesium metabolism and the aetiopathogenesis of multiple sclerosis. *Magnes Res*. 1992;5(4):295-302.
3. Bauer HJ. Concluding remarks in multiple sclerosis in Europe. *An Epidemiological Update*. Leuchtturm - Verlag/LTV Press; 1993. p. 340-2.
4. Craelius W. Comparative epidemiology of multiple sclerosis and dental caries. *J Epidemiol Community Health*. 1978;32(3):155-65.
5. Liblau RS, Fontaine B. Recent advances in immunology in multiple sclerosis. *Curr Opin Neurol*. 1998;11(4):293-8.
6. Lingström P, van Ruyven FO, van Houte J, Kent R. The pH of dental plaque in its relation to early enamel caries and dental plaque flora in humans. *J Dent Res*. 2000;79(2):770-7.
7. Jaworska M, Kierklo A, Pawińska M, Botuliński B, Ruczaj J. Oral hygiene of dental students – in clinical and questionnaire examination. *Polish J Environ Stud*. 2007;16(2):360-3.
8. Hawkins RJ, Zanetti DL, Main PA, Jokovic A, Dwyer JJ, Otchere DF et al. Oral hygiene knowledge of high-risk Grade One children: an evaluation of two methods of dental health education. *Community Dent Oral Epidemiol*. 2000;28(5):336-43.
9. Dabrowska E, Letko R, Balunowska M. Assessment of dentition status and oral hygiene in first year dental students, Medical University of Białystok. *Adv Med Sci*. 2006;51 Suppl 1:104-5.
10. Madejczyk M, Załęska-Chromińska K, Madejczyk A, Samborski D. Oral hygiene in patients with ischemic heart disease hospitalized in cardiological departments. *Polish J Environ Stud* 2007;16(2):490-493.
11. Mealey BL. Peridontal implications: medically compromised patients. *Ann Periodont*. 1996;1(1):256-321.
12. Petersen PE. Sociobehavioural risk factors in dental caries - international perspectives. *Community Dent Oral Epidemiol*. 2005;33(4):274-9.
13. Longhurst RH. An evaluation of the oral care given to patients when staying in hospital. *Prim Dent Care*. 1999;6(3):112-5.