

Oral Health Status in the Participants of the “Juvenile Hypertension Program 2002”

Giedre Valentaviciene, Ona Anuseviciene, Pajauta Paipaliene, Irena Nedzelskiene

SUMMARY

The aim of this study was to evaluate oral health status in the participants of the “2002 Program of Juvenile Hypertension”. 271 people participated in the study. All participants were born in 1964. After the evaluation of their arterial blood pressure, all participants were differentiated into two groups: group 1 – no increase in arterial blood pressure (131 cases); group 2 – arterial hypertension detected (140 cases).

During the study, the following indications were determined: the intensity of dental caries (DMF-T), the condition of periodontal tissues (evaluated using the CPITN (Community Periodontal Index of Treatment Needs) index), and the status of oral hygiene (using Silness-Loe plaque index), as well as oral health habits in the subjects of the study. In addition to that, the prevalence of periodontal diseases (gingivitis and periodontitis) in the participants of the program was determined. DMF-T: group 1 – 18.16±0.35; group 2 – 18.25±0.45. The index of the missing teeth (M) differed statistically significantly between the groups: group 1 – 3.15±0.25; group 2 – 4.12±0.31 ($p<0.05$). The mean value of the CPITN index was the following: group 1 – 1.8±0.68; group 2 – 1.63±0.66. The composition of the CPITN index: healthy periodontium (code 0): group 1 – 7.6%, group 2 – 5.7%; bleeding on probing (code 1): group 1 – 6.1%, group 2 – 5.7%; concretions above and under gums (code 2): group 1 – 63.4%, group 2 – 63.6%; 4-5 mm deep periodontal pockets (code 3): group 1 – 22.9%, group 2 – 22.1%; 6 mm and deeper periodontal pockets (code 4): group 1 – not found, group 2 – 2.1%; Missing sextant (code 5): group 1 – not found, group 2 – 0.8%. In both groups, the CPITN index was directly associated with the frequency of tooth brushing. The Silness-Loe plaque index: group 1 – 1.76±0.69; group 2 – 2.0±0.68. The prevalence of periodontal diseases (gingivitis and periodontitis): group 1 – 92.4%, group 2 – 94.3%. People with diagnosed hypertension more frequently had periodontitis, compared to people in the control group, although the difference was not statistically significant.

Keywords: dental caries, periodontal diseases, prevalence, cardiovascular diseases.

INTRODUCTION

Cardiovascular diseases (CVDs) make a group of special diseases. These diseases cause great concern among physicians worldwide: more than 50% of people suffer from cardiovascular diseases, and CVDs are the primary cause of death in the world [1].

During the last decade, a number of scientific studies were carried out in order to determine the relationship between CVDs and oral health status (especially concerning periodontal diseases) [2, 3, 4, 5]. However, the relationship between these two is still not entirely clear [6, 7]. There is an opinion that *Porphyromonas gingivalis*, Actinomycete actinomycetemcomitans, and other periodontal pathogens (or their by-products) that enter the bloodstream may reach susceptible blood vessels throughout the body. Periodontal infection may also induce – humoral immune responses, that may be protective or destructive by triggering host hyperinflammatory responses with release of cytokines and other proteins. This may result in the development of CVDs. However, the biological bases for CVDs and periodontal diseases have not yet been established, and literature provides only hypotheses [8, 9, 10].

The aim of the study was to evaluate oral health status in the participants of the “Juvenile Hypertension Program 2002” – the intensity of dental caries, the condition of periodontal tissues, and oral hygiene, as well as to determine the prevalence of periodontal diseases (periodontitis and gingivitis) in the participants of this program.

MATERIAL AND METHODS

The study included the participants of the “Juvenile Hypertension Program 2002”. In total, 271 people (145 women and 126 men) participated in the study. All participants were born in 1964. The study was performed at Kaunas University of Medicine (KMU) Clinic of Dental and Oral Diseases. During the study, stomatological examination and inquiry were performed. The findings of the study were recorded in a questionnaire. The examination was performed of a stomatological chair using dental instruments: a mirror, a probe, and a periodontal probe.

The participants' arterial blood pressure (ABP) was measured at KMU Clinic of Cardiology. According to the findings of ABP measurement, all participants were differentiated into two groups:

Group 1: the blood pressure was not increased (systolic blood pressure below 140 mm/Hg, and the diastolic one – below 90 mm/Hg). This group consisted of 131 people.

Group 2: detected arterial hypertension (systolic blood pressure equal to or above 140 mm/Hg, and the diastolic one – equal to or above 90 mm/Hg). This group consisted of 140 people.

The distribution of patients according to sex is presented in Fig. 1.

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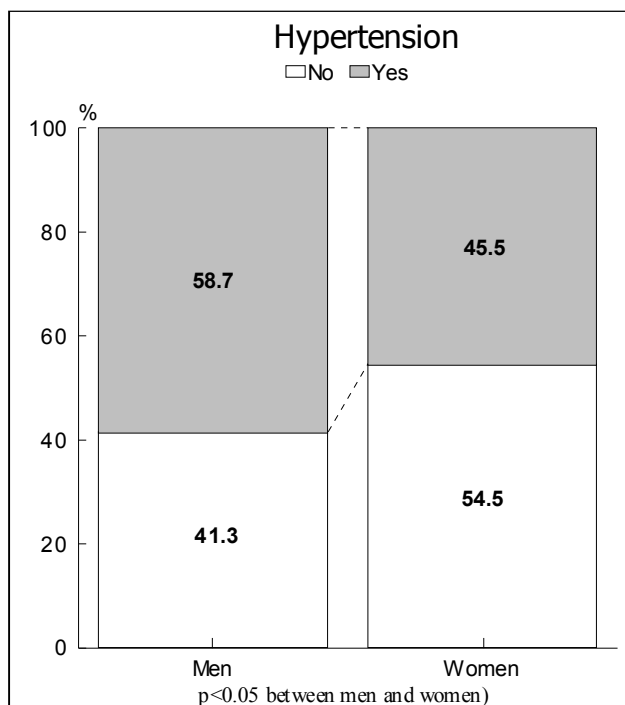


Figure 1. Distribution of subjects according to sex.

The study was based on the WHO methods of study for the evaluation of the intensity of dental caries [11]. The intensity of dental caries was evaluated using the DMF-T index that is based on the sum of decayed (D), missing (M), and filled (F) teeth in one person.

The condition of the periodontal tissues was evaluated using the CPITN (Community Periodontal Index of Treatment Needs) index [12].

The index was determined with the help of a periodontal probe. The teeth of the upper and the lower jaws were divided into sextants; one tooth of each sextant was investigated: 16, 11, 26, 36, 31, 46. The following codes were used for the evaluation:

- Code 0 – Healthy periodontium
- Code 1 – Bleeding on probing
- Code 2 – Concrements above and under gums
- Code 3 – 4-5 mm deep periodontal pockets
- Code 4 – 6 mm and deeper periodontal pockets
- Code 5 - Missing sextant

The findings of the investigation were recorded in a table, indicating the highest code of the examined tooth:

16	11	26
46	31	36

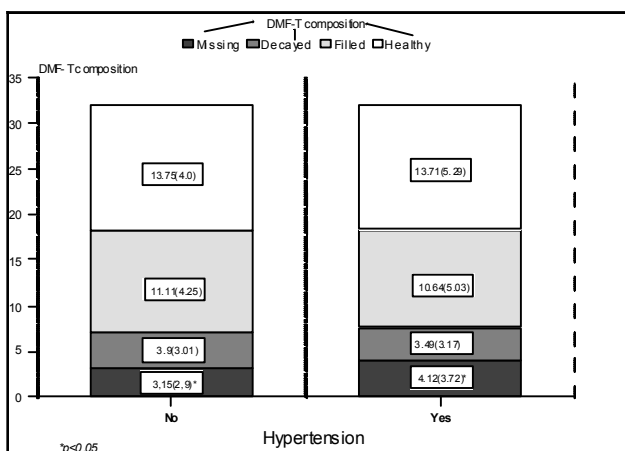


Figure 2. The composition of the DMF-T index in the subjects.

Oral hygiene was evaluated using the Silness-Loe plaque index [13]. This index was used to determine the amount and the position of the plaque. The evaluation was performed by moving the probe on the surface of the tooth as well as by visual evaluation. In the evaluation, four-point system was used: 0 points – no plaque; 1 point – small amount of plaque at the marginal site; 2 points – plaque is clearly visible at the margin of the gums and in the interdental spaces; and 3 points – thick plaque clearly visible and felt with the probe, located on the dental surface, at the gum margins, and in the interdental spaces. The final evaluation is performed by adding up the points and dividing the obtained sum by the number of teeth.

Statistical analysis of the data was performed using Statistica/W5 and SPSS/W10 software packages for data storage and analysis. The interdependence between indicators was evaluated using the χ^2 criterion. The evaluation of mean values was performed using Student's t criterion. The difference with significance level below 0.05 was evaluated as significant.

RESULTS AND DISCUSSION

Statistical analysis of the data and the evaluation of the obtained results showed that DMF-T index in group 1 was 18.16 ± 0.35 , and in group 2 – 18.25 ± 0.45 . The composition of the DMF-T index is presented in Fig. 2. There was a significant difference in the M (missing teeth) index between the two groups: group 1 – 3.15 ± 0.25 , and group 2 (with arterial hypertension) – 4.12 ± 0.31 ($p < 0.05$).

Johanson et al. [14] performed research in Northern Sweden and hypothesized that people with more missing teeth were at higher risk for CVDs compared to those who had all (or nearly all) teeth. Their hypothesis is based on the assumption that the consumption of large amounts of carbohydrates and fats with only limited consumption of fruit results in early loss of teeth. The consequence of such diet is not only lost teeth, but also increased BMI (body mass index) and increased blood cholesterol level, which are risk factors for CVDs. Literature provides more findings supporting the possible relationship between the development of CVDs and loss of teeth [15, 16]. However, this relationship is not entirely clear yet.

In order to determine the degree of the severity of periodontal damage and the treatment needs, CPITN index (Fig. 3) was used. The mean value of the CPITN index was the following: group 1 – 1.8 ± 0.68 ; group 2 – 1.63 ± 0.66 . The analysis of the CPITN index showed that healthy periodontal tissues (code 0) in group 1 were found in 7.6% of cases, while in group 2 – in 5.7% of cases. Bleeding on probing (code 1) in group 1 was found in 6.1% of cases, while in group 2 – in 5.7% of cases. Concrements (calculus) above and under gums (code 2): in group 1 – in 63.4% of cases, and

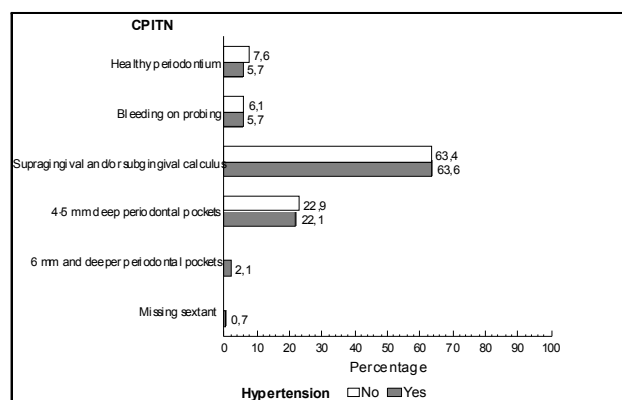


Figure 3. The composition of the CPITN index

in group 2 – in 63.6% of cases. 4-5 mm deep periodontal pockets (code 3): group 1 – 22.9%, group 2 – 22.1%. No 6 mm and deeper periodontal pockets (code 4) were found in group 1, whereas in group 2 they were found in 2.1% of cases. Missing sextant was not detected in group 1, while in group 2 it was found in 0.8% of cases.

Oral hygiene has a major influence on oral health [17]. The evaluation of oral hygiene (Fig. 4) showed that in the majority of cases in both groups dental plaque was detected at the marginal site and between the teeth: in group 1 – in 41.2% of cases, and in group 2 – in 42.1% of cases. Plaque found at the marginal site: in group 1 – in 36.6% of cases, and in group 2 – in 25.7% of cases. No plaque found: group 1 – 3.1% of cases, group 2 – in 2.1% of cases. Plaque covered the crown: group 1 – in 19.1% of cases, group 2 – in 30.0% of cases.

The total value of the Silness-Loe plaque index: group 1 – 1.76 ± 0.69 ; group 2 – 2.0 ± 0.68 .

The participants of the “Juvenile Hypertension Program 2002” were asked about their oral hygiene habits (Fig. 5). This figure shows that as much as 21.4% of the studied people with hypertension did not brush their teeth regularly (the respective percentage in group 1 was 9%). 78.6% people with arterial hypertension brushed their teeth once or twice a day (the respective percentage in group 1 was 90.8%). These differences were statistically significant ($p < 0.05$).

The CPITN index was also closely related to oral hygiene habits (Fig. 6). The mean value of the CPITN index in people who brushed their teeth twice a day was the following: group 1 – 1.43 ± 0.96 , group 2 – 1.33 ± 0.96 . The respective values of this index in people who brushed their teeth once

a day: group 1 – 1.77 ± 0.84 , group 2 – 1.99 ± 0.83 , and in those who did not brush their teeth regularly: group 1 – 2.1 ± 0.91 , group 2 – 2.3 ± 0.89 . These differences were statistically significant ($p < 0.001$).

In this study we also investigated the prevalence of periodontal diseases in the participants of the study. this prevalence in group 1 was found to be 92.4%, and in group 2 – 94.3%. The analysis of these findings showed that 7.6% of people in group 1, and 5.7% of people in group 2 did not have any periodontal diseases. Gingivitis was found in 47.3% of the people in group 1, and in 40% - in group 2. Periodontitis in groups 1 and 2 was found, respectively, in 45.1% and 54.3% of cases. The evaluation of the obtained results showed that people with arterial hypertension less frequently had gingivitis, but more frequently – periodontitis, compared to people in the control group. However, these differences were not statistically significant. Literature contains findings stating that people with periodontal diseases (periodontitis) have a higher risk of developing CVDs, although this is not an independent risk factor for CVDs [18, 19]. It is highly important to take into account other risk factors, such as BMI, smoking, nutrition, and lifestyle [20].

Dentistry specialists may determine and follow up the oral condition in patients who are at risk of developing CVDs. Presumably, there exists a theoretical possibility to decrease the prevalence of CVDs, but this requires a close cooperation between the odontologist and the patient, as well as the dentistry specialists' cooperation with other specialists, like family physicians, cardiologists, etc. [21, 22].

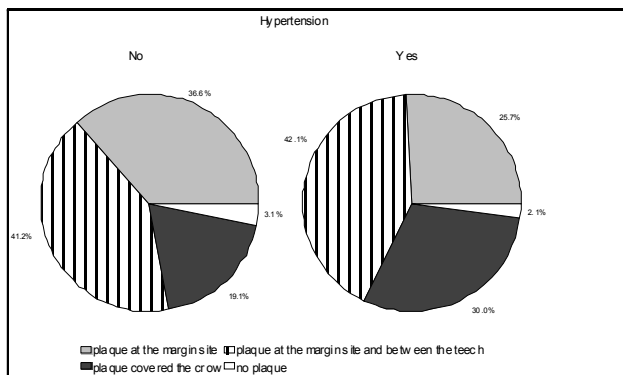
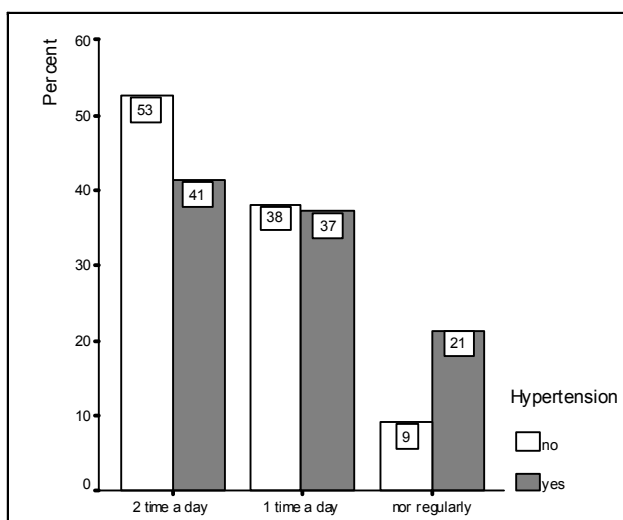


Figure 4. Silness-Loe plaque index



$\chi^2=8.4$; $df=2$; $p < 0.05$

Figure 5. Frequency of the tooth brushing

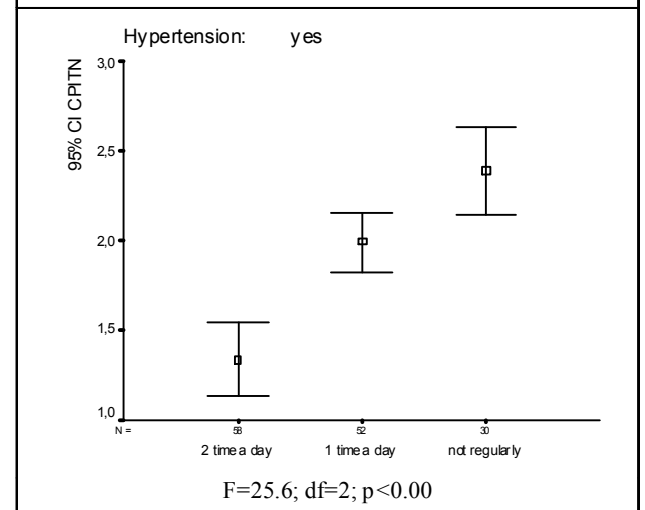
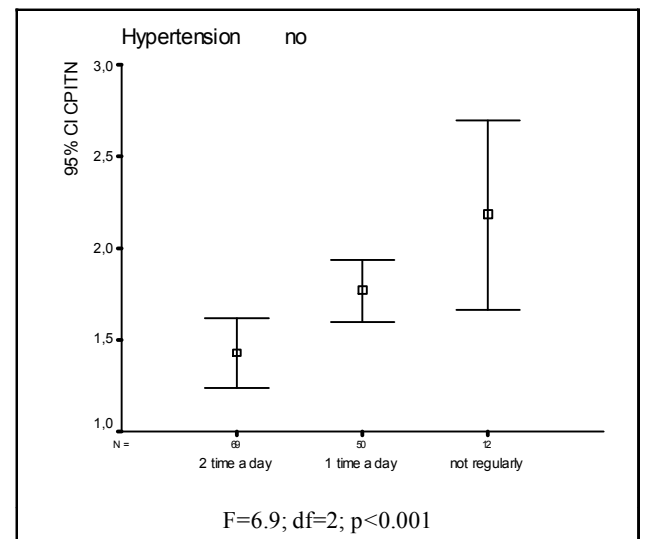


Figure 6. The relationship of the CPITN index with the frequency of the tooth brushing

CONCLUSIONS

- DMF-T index in group 1 was 18.16 ± 0.35 , and in group 2 – 18.25 ± 0.45 . The analysis of this index showed that there was no significant difference between the D (decayed teeth) and the F (filled teeth) indices between the two groups. However, significant difference ($p < 0.05$) in this respect was found in the M (missing teeth) index: group 1 – 3.15 ± 0.25 , and group 2 – 4.12 ± 0.31 .
- The mean value of the CPITN index in group 1 was 1.8 ± 0.68 , and in group 2 – 1.63 ± 0.66 . The highest percentage of people in both groups have calculus (concrements) above and under gums: group 1 – 63.4%, and group 2 – 63.6%.
- CPITN index in both groups was directly associated with the frequency of tooth brushing.
- Silness-Loe plaque index: group 1 – 1.76 ± 0.69 , group 2 – 2.0 ± 0.68 . In both groups, in the majority of cases the plaque covered the teeth at the marginal site and in the interdental spaces: group 1 – 41.2%, and group 2 – 42.1%.
- The prevalence of periodontal diseases (gingivitis, periodontitis): group 1 – 92.4%, group 2 – 94.3%. People in group 2 (those with diagnosed arterial hypertension) more frequently had periodontitis, compared to people in group 1: group 1 – 45.1%, group 2 – 54.3%. however, the difference was not statistically significant.

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In the scientific article which was published in the medical journal “Stomatologija, Baltic Dental and Maxillofacial Journal, Vol.5, N.4.” in 2003 No. 4, page 144 we noticed a technical mistake. The title of the article should be “Factors influencing the health of periodontal tissue and intensity of dental caries”. We apologize the authors for our inaccuracy.