The Average Annual Percent Change Analyzes of Preventive Dental Care in the Slovak Republic, 2014–2016

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Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 06 November 2017 / Accepted: 02 January 2018 / Published: 06 January 2018

Abstract

Objective: To analyse of the average annual percent change (AAPC) of registered dental patients, patients with preventive dental care and patients requiring dental treatment in the period of 2014–2016 in the Slovak Republic. Material and Methods: Data from registered dental patients (n=14,736,888), patients with preventive dental care (n=8,212,441) and patients requiring dental treatment (n=5,262,323) in the period of 2014–2016 were obtained from the Statistical Office of the Slovak Republic; 28,211,652 dental patients were analysed. The Theil-Sen estimator of trend line based on median and its significance was tested by nonparametric Wilcoxon test using statistical software R package. Results: The significant decrease (-4.11%) of the AAPC rates of registered dental patient (p<0.05) during the entire period (2014–2016) can be observed in age subcategory 15-18 years, while in age subcategory 19+ years the non-significant increase (1.08%) of the AAPC rate of registered dental patients in the same period was achieved. In the period of 2014–2016, the highest AAPC rate of patients with preventive dental care with the significant decrease was found in age subcategory 6-14 years (-17.19%; p<0.001). The AAPC rate of patients requiring dental treatment proved the significant negative values in age subcategory 0-5 years (-7.26%; p<0.01), in age subcategory 6-14 years (-9.33%; p<0.001), in age subcategory 15-18 years (-8.81%; p<0.01). Conclusion: The highest decrease AAPC rate of registered dental patients was observed in age subcategory 15-18 years. The statistical significant decrease AAPC rate of patients with preventive dental care was found in children ≤ 18 years. In patients requiring dental treatment (≤ 18 y.) was observed decrease AAPC rate.

Keywords: Statistics, Nonparametric; Dental Care; Oral Health.
Introduction

Preventive dental care is the basis of optimal oral health [1]. According to previous study is the preventive dental care least one dental visit during the year [2]. The dental care access, lower income, ethnicity and race minority, demographic factors and educational levels [3] impacts on the preventive dental care [2].

Dental caries belongs to the most common chronic disease in childhood [4-6]. Between preventive dental care and tooth decay-related expenditures was not found significantly association [7].

In the Slovak Republic, in dental clinics patients <18 years of age are entitled to two preventive examinations and patients ≥18 years of age are entitled to one preventive examination per year. The preventive dental care is not considered mandatory, but the patient has to pay additional treatment for the following year.

In the dental care studies was found income inequality exists [8,9]. The dental care insurance is not provided publicly and patients paid high sums for dental treatment [10]. Therefore, the aim of the study is to analyse of the average annual percent change (AAPC) of registered dental patients, patients with preventive dental care and patients requiring dental treatment in the period of 2014-2016 in the Slovak Republic.

Material and Methods

Data from registered dental patients (n=14,736,888), patients with preventive dental care (n=8,212,441) and patients requiring dental treatment (n=5,262,323) in the period of 2014-2016 were obtained from the Statistical Office of the Slovak Republic; 28,211,652 dental patients were analysed.

The average annual percent change (AAPC) indicator [11] was analyzed. Thus, the mean percentage difference of annual growth/decline can be obtained, using the following equation:

\[
AAPC = \frac{1}{n} \sum_{i=1}^{n} \frac{x_i - x_{i-1}}{x_{i-1}} \times 100
\]

where x represents input vector of sum of registered dental patients, patients with preventive dental care or patients requiring dental treatment in period n in year i, in each analyzed period.

We used Theil-Sen estimator [12] of trend line based on median and its significance was tested by nonparametric Wilcoxon test using statistical software R package

Results

The average annual percent change of registered dental patients, patients with preventive dental care and patients requiring dental treatment in the period of 2014-2016 in the Slovak Republic can be seen in Table 1.

The significant decrease (-4.11%) of the AAPC rates of registered dental patient (p<0.05) during the entire period (2014-2016) can be observed in age subcategory 15-18 years, while in age
subcategory 19+ years the non-significant increase (1.08%) of the AAPC rate of registered dental patients in the same period was achieved (Table 1).

In the period of 2014-2016, the highest AAPC rate of patients with preventive dental care with the significant decrease was found in age subcategory 6-14 years (-17.19%; p<0.001). The AAPC rate of patients with preventive dental care proved the negative values in each age category with not significant decrease in age subcategory 19+ years (-0.63%). In the period of 2014-2016, we found decrease in preventive dental care in children and teenagers during dental care (Table 1).

The AAPC rate of patients requiring dental treatment proved the significant negative values in age subcategory 0-5 years (-7.26%; p<0.01), in age subcategory 6-14 years (-9.33%; p<0.001), in age subcategory 15-18 years (-8.81%; p<0.01) (Table 1).

Table 1. The average annual percent change (AAPC) of registered dental patients (n=14,736,888), patients with preventive dental care (n=8,212,441) and patients requiring dental treatment (n=5,262,323) in the period of 2014-2016, the Slovak Republic.

<table>
<thead>
<tr>
<th>Year</th>
<th>Age (years)</th>
<th>Registered dental patients (n)</th>
<th>Patients with preventive dental care (n)</th>
<th>Patients requiring dental treatment (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0 – 5</td>
<td>94,521</td>
<td>78,498</td>
<td>36,965</td>
</tr>
<tr>
<td></td>
<td>6 – 14</td>
<td>887,055</td>
<td>299,338</td>
<td>172,269</td>
</tr>
<tr>
<td></td>
<td>15 – 18</td>
<td>211,839</td>
<td>143,550</td>
<td>91,974</td>
</tr>
<tr>
<td></td>
<td>19+</td>
<td>4,261,160</td>
<td>2,136,806</td>
<td>1,450,333</td>
</tr>
<tr>
<td></td>
<td>0 – 5</td>
<td>95,543</td>
<td>80,306</td>
<td>33,153</td>
</tr>
<tr>
<td></td>
<td>6 – 14</td>
<td>389,101</td>
<td>310,554</td>
<td>175,822</td>
</tr>
<tr>
<td></td>
<td>15 – 18</td>
<td>218,882</td>
<td>151,513</td>
<td>94,874</td>
</tr>
<tr>
<td></td>
<td>19+</td>
<td>4,189,112</td>
<td>2,154,802</td>
<td>1,432,905</td>
</tr>
<tr>
<td>2015</td>
<td>0 – 5</td>
<td>96,074</td>
<td>99,834</td>
<td>42,263</td>
</tr>
<tr>
<td></td>
<td>6 – 14</td>
<td>984,290</td>
<td>405,664</td>
<td>205,003</td>
</tr>
<tr>
<td></td>
<td>15 – 18</td>
<td>229,612</td>
<td>187,742</td>
<td>108,600</td>
</tr>
<tr>
<td></td>
<td>19+</td>
<td>4,169,739</td>
<td>2,163,654</td>
<td>1,412,962</td>
</tr>
<tr>
<td>2014</td>
<td>0 – 5</td>
<td>-0.82</td>
<td>-13.28***</td>
<td>-7.26**</td>
</tr>
<tr>
<td></td>
<td>6 – 14</td>
<td>-0.92</td>
<td>-17.19***</td>
<td>-9.33***</td>
</tr>
<tr>
<td></td>
<td>15 – 18</td>
<td>-4.11*</td>
<td>-14.7***</td>
<td>-8.81**</td>
</tr>
<tr>
<td></td>
<td>19+</td>
<td>1.08</td>
<td>-0.63</td>
<td>1.30</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001.

Discussion

The preventive dental care often seems like a vanity in oral health. Worldwide, millions of dollars are spent to treat a preventable disease (dental caries) [13]. Despite the decline of dental caries in the past 30 years, dental caries in children (<6 y.) plays an important dental public health problem [14]. Sucrose is the most important dental caries aetiological cause [14]. Higher dental caries prevalence in children was associated with a low parent’s educational level and with a low household income [15].

Poor oral health is associated with other diseases (low-birth weight and cardiovascular disease) [16]. In a previous study insurance coverage, age and residential location are statistically
significant in dental caries status while gender or race and ethnicity are non-significant in dental caries status [16]. In this study was found about 50% children (0-5 y.) who needed dental treatment, however children have had a preventive visit in the same period was achieved. We recommend parents participated on preventive oral program for children, because parents have the lack of knowledge on oral health [3]. It has been shown that children whose parents cleaned teeth had cleaner mouths and less gingivitis [17]. In another research, 78% parents reported their child's oral health to be good, 22% parents reported their child's oral health to be poor [18]. Improvement of children oral health cannot be expected without any oral health policy interventions [19].

A positive trend of registered dental patients (19+ y.) was observed in the period of 2014-2016. Our results showed that nearly a half of adults (19+ y.) did not receive preventive dental care in the period of 2014-2016. This can be partly explained that adults avoid making preventive dental care because of their fear and pain and was confirmed by previous authors [20]. The same results were observed in children.

Children’s dental anxiety and dental fear can inhibit their dentist visits. The etiology of children dental fear is multifactorial (current dental caries, current dental pain, previous history of dental treatment, family experiences, environmental characteristics, family socioeconomic status and mothers’ dental attitudes) [21].

**Conclusion**

The highest decrease AAPC rate of registered dental patients was observed in age subcategory 15-18 years. The statistical significant decrease AAPC rate of patients with preventive dental care was found in children ≤ 18 years. In patients requiring dental treatment (≤ 18 y.) was observed decrease AAPC rate. Our results are the argument for dental intervention aimed at dental education of parents.

**References**