The association between bronchial asthma and dental caries in children of the developmental age

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Introduction

Allergic disorders that increasingly manifest in the early years of a child’s life have become one of the most serious challenges faced currently by modern paediatrics and other medical specialties. Epidemiological studies showed that 3.2% of children in the northern part of Poland suffer from bronchial asthma [Pisiewicz et al, 1996]. Asthma prevalence in Europe has been reported at 8-12%, while in other countries between 2.3-30.8% of the population is affected [NHLBI, 1995].

Diseases of allergic origin, such as bronchial asthma, are chronic in nature and require long-term multi-drug therapy, some of which may influence the child’s growth and development [National Institutes of Health, 1995] or have a demineralising potential [Tootla et al., 2005]. There is equivocal published data as to whether bronchial asthma is a predisposing factor in the development of caries.

In this study we assessed the caries prevalence in children aged 3-15 years suffering from bronchial asthma in the north of Poland.

Material and methods

During the year 1998 clinical dental examinations were conducted on 326 children with chronic bronchial asthma aged 3-15 years. The subjects were treated at the Gdansk-Oliwa Specialist Health Care Centre for Mother and Child, where the diagnosis of asthmatic children was performed according to the parameters published by the National Heart, Lung and Blood Institute [NHLBI, 1995].

While these asthmatic children populations suffered from different levels of disease, severity and different medication regimes, all subjects had been prescribed some form of medication to control their asthma. All our subjects were using β-adrenergic agonists and 32 children from different age groups used glucocorticoids. None of the subjects were taking antibiotics at the time, but may have at some point in the past. We were unable to obtain complete dosage and duration of use of asthma medication. Asthmatic children with any other concomitant health problems were excluded from the study. For the purpose of this study the test population was divided into 11 age categories (Table 1) to more accurately examine the change in the primary and permanent dentition in each group between ages 6-14. Healthy children (n=326) matched for age, sex and socioeconomic status were
used as controls. The controls were randomly selected in a three-stage procedure from two kindergartens in Gdansk and Sopot (children aged 3-6), from a primary school (children aged 7-11) and a high school (children aged 12-15) in Gdansk. Non-asthmatic controls were not selected from the children treated at the Specialist Health Care Center for Mother and Child as all children treated at this site had serious health problems.

Two investigators were trained and calibrated and the reliability of the single examiner was assessed by re-examination of 10 children on a different day. Kappa values of over 90% were obtained. The WHO method and criteria were used for the recording of caries data [WHO, 1997].

Estimation of the primary and permanent dentitions was done using the dmft/DMFT indexes. Student’s t-tests were applied for the statistical evaluation of means with a critical level of significance set at 0.05.

### Results

The average values of dmft/DMFT, the age of the bronchial asthma children and controls with primary and permanent dentition are presented in Table 2.

In the primary dentition the highest dmft value is

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### Table 1 - Structure of investigated population of bronchial asthma children according to age and sex.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>20</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
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<td>14</td>
<td>30</td>
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<tr>
<td>12</td>
<td>22</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td>13</td>
<td>17</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>14</td>
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<td>11</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>11</td>
<td>21</td>
</tr>
</tbody>
</table>

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### Table 2 - Comparison of average dmft/DMFT values in primary and permanent dentitions in bronchial asthma children and controls according to age.

<table>
<thead>
<tr>
<th>Age Subjects/Population</th>
<th>Dental caries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dt</td>
<td>mt</td>
</tr>
<tr>
<td>3-5 years n. 30</td>
<td></td>
<td></td>
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<tr>
<td>asthma controls</td>
<td>3.77</td>
<td>0.13</td>
</tr>
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<td>controls</td>
<td>4.56</td>
<td>0.13</td>
</tr>
<tr>
<td>6 years n. 30</td>
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<tr>
<td>asthma controls</td>
<td>5.13</td>
<td>0.17</td>
</tr>
<tr>
<td>controls</td>
<td>4.97</td>
<td>0.17</td>
</tr>
<tr>
<td>7 years n. 30</td>
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</tr>
<tr>
<td>asthma controls</td>
<td>4.17</td>
<td>0.17</td>
</tr>
<tr>
<td>controls</td>
<td>4.17</td>
<td>0.17</td>
</tr>
<tr>
<td>8 years n. 30</td>
<td></td>
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<tr>
<td>asthma controls</td>
<td>4.30</td>
<td>0.17</td>
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<tr>
<td>controls</td>
<td>3.80</td>
<td>0.17</td>
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<tr>
<td>9 years n. 30</td>
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<tr>
<td>asthma controls</td>
<td>3.37</td>
<td>0.07</td>
</tr>
<tr>
<td>controls</td>
<td>3.23</td>
<td>0.07</td>
</tr>
<tr>
<td>10 years n. 30</td>
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<tr>
<td>asthma controls</td>
<td>2.53</td>
<td>0.17</td>
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<tr>
<td>controls</td>
<td>1.60</td>
<td>0.17</td>
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<td>11 years n. 30</td>
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<td>0.10</td>
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<tr>
<td>controls</td>
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<td>0.07</td>
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<td>12 years n. 35</td>
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<tr>
<td>asthma controls</td>
<td>0.69</td>
<td>0.03</td>
</tr>
<tr>
<td>controls</td>
<td>0.14</td>
<td>0.06</td>
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<tr>
<td>13 years n. 30</td>
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</tr>
<tr>
<td>asthma controls</td>
<td>4.23</td>
<td>0.30</td>
</tr>
<tr>
<td>controls</td>
<td>4.23</td>
<td>0.30</td>
</tr>
<tr>
<td>14 years n. 30</td>
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<tr>
<td>asthma controls</td>
<td>4.36</td>
<td>0.30</td>
</tr>
<tr>
<td>controls</td>
<td>4.36</td>
<td>0.30</td>
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<tr>
<td>15 years n. 21</td>
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<td></td>
</tr>
<tr>
<td>asthma controls</td>
<td>3.24</td>
<td>0.04</td>
</tr>
<tr>
<td>controls</td>
<td>3.24</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*p<0.05
seen at the age of 6. In children with bronchial asthma
5.57 of primary teeth were affected with caries, while
in the controls the average dmft was 5.23. At the ages
of 10, 11 and 12 years, the asthmatic children had
statistically significant higher average dmft values
when compared with their peers (p<0.05). In both
populations investigated, the average dmft value was
substantially dependent upon the dt components. A
similar increase in average DMFT was observed in
asthmatic children compared with controls. The
highest statistically significant differences between
DMFT values in test and control populations was seen
at 13 years (6.76 in asthmatic subjects and 5.06 in
controls). The DT factor was greatest in children aged
14 with values of 4.36 and 3.27 in asthmatic subjects
and the controls, respectively. Data from controls
subjects indicated that children aged 6, 7, 8, 11 and 12
have a higher, but not statistically significant (p>0.05),
DT factor than their bronchial asthma peers.

Discussion

The current published literature is equivocal as to
whether bronchial asthma is a predisposing factor in
the development of caries. The results of published
studies cannot be compared directly as there are too
few reports with differences in protocols and limited
subject populations. Some authors do confirm the
higher incidence of caries in children with asthma
[McDerra et al, 1998; Milano, 1999], while others
have found no correlation [Meldrum, 2001; Shulman,
2001]. Our results have suggested that chronic
bronchial asthma children suffer higher values of
dmft/DMFT compared with controls. However, the
results in most age groups are not statistically
significant. To complicate the situation further, the
high rate of dental caries in the whole Polish
population does not allow a direct comparison between
the dmft/DMFT values in the Polish children with
bronchial asthma and other countries.

In view of the epidemiological situation in the last 10
years concerning dental health, in 1993, the World
Health Organization and the Federation Dentaire
Internationale set goals towards improving the oral
health of children, adolescents and adults by the year
2010 [Aggeryd, 1983]. Accordingly, the DMFT value
in 12-year-old children should not exceed one tooth. It
has been determined that the dental health of children
at 12 years of age is the best indicator of the
effectiveness of educational, prophylactic and
therapeutic efforts that may be used to model the
future of the permanent dentition.

Interestingly, in 1995, the DMFT value of 12 year-
old children living in a large region in Poland
[Emerich-Poplatek, 1997] was measured at 3.93. This
value is higher than that for both bronchial asthma
children and the controls studied in 1998. The
significant component of the average DMFT at that
age was also largely determined by the number of
Decayed and Treated teeth. In children with bronchial
asthma, the DT value was 1.97 and was lower than the
respective figure for the controls (2.09 of a tooth) and
lower again than the figure of 2.87 that was determined
in 1995 in a large regional town in the Gdansk
province [Emerich-Poplatek, 1997]. A 1998 study
demonstrated that there were no extracted permanent
teeth either in asthmatic subjects or the controls. The
number of filled permanent teeth in asthmatic children
was higher than in the controls, the respective figures
being 1.49 and 1.17, and again lower by 0.39 of filled
tooth than the figure for children from Gdansk
province obtained in a 1995 study [Emerich-Poplatek,
1997].

By the age of 13, the asthmatic children had 1.70
more cariously-affected teeth (DMFT 6.76) than their
peers from the control (DMFT =5.06). In asthmatic
children between 12 and 13 year of age, the number of
cariously-affected permanent teeth dramatically
increased by 3.30, while in the controls there was a rise
by only 1.80. This increase in the 12-13 year age group
has not been previously reported and may indicate a
higher risk of developing caries in children with
chronic bronchial asthma and also a more rapid
progression of dental caries, particularly in the period
of enamel maturation.

Conclusions

An observation of a large increase in caries in
permanent teeth during the formative ages of 12-14
years in children suffering from bronchial asthma
under treatment with medical drugs requires special
dental care for this patient group, and makes
professional fluoride prophylaxis and interceptive
preventive programmes imperative from an early age.

References

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