Oral Health and Asthma

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Pia Wogelius, dentist, ph.d.
• Oral Health among Danish children
• Oral Health among children with asthma
  Candida
  Dental Caries
  Enamel Hypomineralization
  Dental erosion
  Dental anxiety

Adults
  Periodontology
Oral Health among Danish children

- Law of Child Dental Care 1972
- SCOR (Sundhedsstyrelsens Centrale Odontologiske Register)
- Mandatory reporting - all municipalities

- Statistics, yearly
  - National
  - Regional
  - Municipality
  - Schools
  - Clinics, etc.
Progress of Oral Health

• Decayed surfaces among 5-yr Olds
  - 1988: 2.50
  - 2017: 0.85

• Decayed surfaces among 15-yr Olds
  - 1988: 6.70
  - 2017: 1.22

• No caries among 15-yr Olds 2017: 65.13%

1) The amount of caries is decreased very much among Danish children
2) We still have caries in Denmark
Possible reasons of the success

- Prevention?
- Population dentistry?
- Risk based dentistry (are children with asthma treated as a risk group)?

- Dental caries and socioeconomy
- Asthma and socioeconomy
The asthma and Allergy Association

astma-drugs double the risk og caries*

“The primary teeth are vulnerable, Pay attention to children with asthma since the enamel in primary teeth are thinner”

Prof. Svante Tweetman

Caries

β2-agonists ⇒

  saliva sekretion rate decreases
  saliva pH-value decreases
  Changes of the microbitica

Caries

$\beta_2$-agonister (inh) $\Rightarrow$

saliva sekretion rate decreases
saliva pH-value decreases
Changes of the microbitica

Review: OR of caries

in primary teeth: 2.7; 95% CI: 1.6-4.6)
in permanent teeth: 2.0; 95% CI: 1.4-2.9)

*Alavaikko et al. 2011
Use of asthma-drugs and risk of dental caries among 5 to 7 year old Danish children: a cohort study

Wogelius et al.
Community Dent Health 2004
Caries

Information on asthma-drug use
  The prescription database

Information on caries
  The SCOR-database

Reporting is mandatory
  5, 7, 12 og 15 Years
Caries

2 Asthma-groups
   1) β2-agonists and inh. steroids 3-7 Years
   2) β2-agonists and inh. steroids 5-7 Years

Control-group
   No β2-agonists OR inh. Steroids 3-7 år
Caries

Outcome

Number of children with new caries from 5-7 Years in the primary dentition

Number of children with new caries from 5-7 Years in the permanent dentition
## Children (N) with asthma drug prescriptions (inhaled drugs)

<table>
<thead>
<tr>
<th>Asthma Drug</th>
<th>3-5 yr</th>
<th>5-7 yr</th>
<th>3-7 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>β2-agonister</td>
<td>83</td>
<td>107</td>
<td>17</td>
</tr>
<tr>
<td>Steroids</td>
<td>20</td>
<td>39</td>
<td>1</td>
</tr>
<tr>
<td>β2-agonister + steroids</td>
<td>283</td>
<td>295</td>
<td>169</td>
</tr>
<tr>
<td>No asthmadrug prescriptions</td>
<td>3424</td>
<td>3994</td>
<td>3156</td>
</tr>
</tbody>
</table>
## New caries

<table>
<thead>
<tr>
<th>Dentition</th>
<th>Group</th>
<th>Number Children</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prim</td>
<td>Asthma</td>
<td>72</td>
<td>42.6</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>1405</td>
<td>44.5</td>
</tr>
<tr>
<td>Perm</td>
<td>Asthma</td>
<td>18</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>Kontrol</td>
<td>208</td>
<td>6.7</td>
</tr>
</tbody>
</table>
Results

Primary Dentition
No increased risk

Permanent Dentition
Among 295 children with prescriptions of both inhaled β2-agonists and corticosteroids between 5 and 7 years:
Relative risk: 1.45 (95% C.I.: 0.99–2.11)

Among 169 children with prescriptions of both inhaled β2-agonists and corticosteroids between 3 and 7 years:
Relative risk 1.62 (95% C.I.: 1.03–2.56)
Enamel Hypominalization

The frequency of grave hypominalization in new permanent molars among 7-8 yr-olds is equal to the frequency of caries in new permanent molars.

Many grave hypominalizations are codes as caries.

Sufficient treatment is very difficult.

Causes: genetic or lifestyle?
Hypominalization

8 studies
different results
a tendency of increased risk of hypominalizations

Take care of erupting teeth
Method

(all=891)

745 children
7-9 Yr OLds

All examined for hypomineralization

1) Prevalens

2) Combine information to register data of drug-use
Hypomineralization

- 1st permanent molar
- Continuing formation of enamel
- Birth
- 3 year after birth
- 6 year
- Eruption of 1st permanent molar

20nd month of pregnancy
Hvad viste resultaterne?

- Included: N=891
- Examination: N=745 (83.6%)
- Eruption of all permanent 1st molars: N=647
- Drop-outs: N=146
Result

% children with use of different types of drugs anytime or during the first 3 yrs

Drugs
- No drugs
- Peroral b2
- Inh b2+steroid

% Anytime
- No drugs: 45%
- Peroral b2: 40%
- Inh b2+steroid: 5%

% 1st 3 yrs
- No drugs: 5%
## Result

<table>
<thead>
<tr>
<th></th>
<th>Generel hypo</th>
<th>Grave hypo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs before 3 years</td>
<td>15 (31,9 %)</td>
<td>6 (12,8%)</td>
</tr>
<tr>
<td>(N=47)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No drugs (N=264 børn)</td>
<td>96 (36,4%)</td>
<td>13 (4,9%)</td>
</tr>
<tr>
<td>OR</td>
<td>0,82</td>
<td>2,42</td>
</tr>
<tr>
<td>95% CI: 0,39-1,65</td>
<td>95% CI: 0,70-7,43</td>
<td></td>
</tr>
</tbody>
</table>

Wogelius et. al: Community Dent Oral Epidemiol, 2010
Discussion

• A possible association between asthma drug use and prevalence of grave hypomineralization

• The drug or the disease?

• Low statistical strength

• Further research is necessary
conclusion

- The Results indicate that it is good practice to pay certain attention to

- Children with asthma with permanent molars in eruption
Erosion
Erosion

- Drug treatments for asthma may cause erosive tooth damage
- We would like to draw attention to a potential problem that may arise with the dentition when some of these drugs are taken

The pH of the powdered and aerosol forms differed significantly ($P<0.001$), with almost all drugs having a pH of $<5.5$ in the powdered form. Tooth substance begins to dissolve at pH 5.5

<table>
<thead>
<tr>
<th>Generic name of drug</th>
<th>Proprietary name</th>
<th>Dose (μg)</th>
<th>Delivery</th>
<th>pH*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone dipropionate</td>
<td>Becotide</td>
<td>200</td>
<td>Powder</td>
<td>4.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone</td>
<td>Flixotide</td>
<td>100</td>
<td>Powder</td>
<td>4.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budesonide</td>
<td>Pulmicort</td>
<td>400</td>
<td>Aerosol</td>
<td>6.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salbutamol</td>
<td>Ventolin</td>
<td>200</td>
<td>Powder</td>
<td>5.94</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>Serevent</td>
<td>50</td>
<td>Powder</td>
<td>5.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terbutaline sulphate</td>
<td>Bricanyl</td>
<td>500</td>
<td>Powder</td>
<td>4.31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipratropium bromide</td>
<td>Atrovent</td>
<td>20</td>
<td>Aerosol</td>
<td>7.88</td>
</tr>
<tr>
<td>Sodium cromoglycate</td>
<td>Intal</td>
<td>20</td>
<td>Powder</td>
<td>5.54</td>
</tr>
<tr>
<td></td>
<td>Cromogen</td>
<td>5</td>
<td></td>
<td>7.34</td>
</tr>
</tbody>
</table>
# Erosion of the enamel

<table>
<thead>
<tr>
<th>Navn</th>
<th>Form</th>
<th>pH-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricanyl</td>
<td>Powder</td>
<td>4.31</td>
</tr>
<tr>
<td></td>
<td>Aerosol</td>
<td>7.03</td>
</tr>
<tr>
<td>Pulmicort</td>
<td>Powder</td>
<td>6.47</td>
</tr>
<tr>
<td></td>
<td>Aerosol</td>
<td>8.34</td>
</tr>
<tr>
<td>Ventoline</td>
<td>Powder</td>
<td>5.94</td>
</tr>
<tr>
<td></td>
<td>Aerosol</td>
<td>9.30</td>
</tr>
<tr>
<td>Serevent</td>
<td>Powder</td>
<td>5.49</td>
</tr>
<tr>
<td></td>
<td>Aerosol</td>
<td>7.24</td>
</tr>
</tbody>
</table>
Few studies
3 small cross-sectional, 1 large follow-up
The Follow-up study showed no increased risk

Conclusion: Uncertainty about the risk
Look at the medicine in case of suspicion
Reflux is more common among children with asthma

Dental anxiety

Dental anxiety is associated with irregular link to dental service*

- It is hard to be dental anxious

- Are children with asthma dental anxious compared to children without asthma?

Studypopulation

Total N=1707

Inclusion N=1666

Response N=1281

Dental record N=1235

Eksclusion N=44

All 6 -8 Yr-Olds from Nibe, Støvring, Sejlflod, Skørping
Dental anxiety

Information on asthma from

The Prescription Database

Asthma

\( \beta_2 \)-agonists AND inh. steroid during the last year before the questionnaire

Controls

No asthmadrugs 5 year before the questionnaire
Tandlægeangst

Survey. Questionnaire

"Children’s Fear Survey Schedule-Dental Subscale”

- the parent answers on behalf their child
- between 1 and 5 point to each question
- possible score: 15-75
- dental anxiety: score >31 (=mean + 1SD)
# Dental anxiety

<table>
<thead>
<tr>
<th>Group</th>
<th>Anxiety-score Median</th>
<th>Score &gt;31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>25.2</td>
<td>25%</td>
</tr>
<tr>
<td>Control</td>
<td>23.7</td>
<td>15%</td>
</tr>
</tbody>
</table>
Dental anxiety

Conclusion:
Adjusted for ear-problems, toothaches, age and gender we found an association between asthma and dental anxiety

OR = 1.70; (95% CI: 0.90-3.22)

Oral health in Danish children with asthma

- Increased risk of dental anxiety
- Increased risk of dental caries in the permanent dentition
- ? Risk of hypomineralization in the permanent dentition

- No increased risk of caries in the primary dentition
- (In contrast to findings from other countries)
Periodontitis
4 | CONCLUSIONS

The data from this SR strongly suggest the association of asthma with periodontal disease. After conducting the meta-analysis, there was a significant difference in favor of participants without asthma for GB, PI, and GI parameters. A greater number of longitudinal studies evaluating the relationship between asthma and periodontal disease are encouraged in the future.

Review, Moraschini et al, 2017
Advices

• Good oral hygiene
• Tooth paste with fluoride
• Electric Brushes
• Color Test

• Drink water
Plaque has tooth color