Prevalence and incidence of apical periodontitis in Denmark

Lise-Lotte Kirkevangel
Dynamics of AP
Pool of prevalent cases

incidence rate

healing rate

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Pool of prevalent cases

increased incidence rate

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Pool of prevalent cases

reduced healing rate

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Background

Studies of Scandinavian populations had shown that the quality of root-fillings improved significantly from 1974-1990. However, the periapical status did not improve correspondingly.

Own investigations

- Repeated cross-sectional study of dental school patients 1974 and 1998
- Cross-sectional study of a general Danish population 1997
- Longitudinal study of a general Danish population 1997-2003
Repeated cross-sectional studies

Pool of prevalent cases

incident cases

healing cases

Cross-sectional study  Cross-sectional study

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Aims

To compare two populations examined in 1974-75 and 1997-98:

• The quality of root fillings made in general practice
• The periapical status of root-filled teeth
Material

Two groups:

Group 1: 358 patients examined in 1974-75 with 975 root-filled teeth

Group 2: 244 patients examined in 1997-98 with 753 root-filled teeth

Inclusion criteria: presence of 1 > root filling
Lateral seal of the root-filling

Adequate

Inadequate

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Length of root-filling

Adequate

Inadequate

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Coronal restoration

Adequate

overhang

open margin

Inadequate

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Periapikal Index (PAI)

Ørstavik et al. 1986

PAI score 1

PAI score 2

PAI score 1

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Periapikal Index (PAI)

Ørstavik et al. 1986

PAI score 3

PAI score 4

PAI score 5
Conclusions

The technical quality of coronal fillings, crowns and root fillings improved significantly from 1975 to 1998.

However, the periapical status did not seem to improve correspondingly – rather the contrary.

Kirkevang et al. 2001
Discussion

Considerations in interpretation:
- dental school patients
- groups and age not fully comparable
- preoperative periapical diagnosis unknown
- bacteriological status unknown
Investigations

- Repeated cross-sectional study of dental school patients 1974-1998
- Cross-sectional study of a general Danish population 1997
- Longitudinal study of a general Danish population 1997-2003
Cross-sectional studies

Pool of prevalent cases

incidence rate

healing rate

Cross-sectional studies

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Study population

616 randomly selected individuals living in Aarhus County (age 20-60+) who received a full-mouth radiographic survey in 1997
Individual-related data analyses
## Study population

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N individuals</td>
<td>616</td>
</tr>
<tr>
<td>Individuals with AP</td>
<td>42.0%</td>
</tr>
<tr>
<td>Individuals with root-filled teeth</td>
<td>51.8%</td>
</tr>
</tbody>
</table>
Distribution of individuals related to number of teeth

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Distribution of individuals related to number of teeth with AP

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Distribution of individuals related to number of root-filled teeth

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Distribution of individuals related to number of root-filled teeth with AP

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Identification of individuals with apical periodontitis
Background

High prevalence of apical periodontitis in populations

major dental health problem

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Background

Few studies had tried to identify individuals in risk of having AP by focusing on the association between different risk indicators and the presence of AP
Material

Full-mouth surveys (16 images) from 613 randomly selected individuals living in Aarhus County in 1997, age 20-60+

- furthermore -

Socio-economical data concerning the 613 individuals retrieved from Statistics Denmark

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Material

Socio-economical variables:

Gender, age, occupation, education in progress, number of children, marital status and indicators of general and dental health

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Material

Dental radiographic variables:

Number of: teeth, secondary caries, coronal fillings, inadequate coronal fillings, crowns, inadequate crowns, root fillings.

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Statistical Analyses

• Logistic regression analyses
• The independent variables consisted of the socio-economic and dental variables
• The dependent variable was ≥1 AP in the individual
Results

Risk estimates with 95% confidence intervals. All estimates are mutually adjusted.

Age: 20-29
D service: 1-5
Smoking: no
N teeth: 1-18
Sec caries: 0
Inad filling: <3
N rootfilling: 0
Conclusion

The most important indicators identifying individuals in risk of **having** AP was:

- presence of a root-filling
- presence of several caries lesions
- quality of the coronal restorations
- the regularity of dental visits
- smoking

- Socio-economic status of the individual did not provide much information on the periapical status

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Tooth-related data analyses

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Identification of teeth with apical periodontitis
### Study sample

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>N teeth</td>
<td>16022</td>
</tr>
<tr>
<td>Teeth with AP</td>
<td>3.3%</td>
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<tr>
<td>Teeth with root-filling</td>
<td>4.8%</td>
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<tr>
<td>Teeth with root-filling and AP</td>
<td>51.8%</td>
</tr>
</tbody>
</table>
Tooth-specific risk indicators

Primary caries (no, yes)
Secondary caries (no, yes)
Coronal filling (no, adequate, inadequate)
Crown (no, adequate, inadequate)
Pulpal post (no, yes)
Root filling (no, yes)
Tooth number (1, 2, 3, 4, 5, 6, 7)
Jaw (maxillaris, mandibula)
Statistical Analyses

- Conditional logistic regression analyses
- The independent variables were tooth-specific variables
- The dependent variable was AP in the tooth

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Tooth-specific risk indicators

Risk estimates with 95% confidence intervals. All estimates are mutually adjusted.
Tooth-specific risk indicators

Lateral seal
- Only adequate in apical part

Only adequate in coronal part

Inadequate

Length

Short > 3 mm

Flush with apex

Overfilling

Odds ratio relative to an adequate root filling

Risk estimates with 95% confidence intervals. All estimates are mutually adjusted.
Conclusions

Risk indicators related to presence of AP in teeth:
- Root fillings, especially inadequate
- Crowns, especially inadequate
- Fillings, especially inadequate
- Primary carious lesions
- First molars, especially maxillary
Investigations

• Repeated cross-sectional study of dental school patients 1974-1998
• Cross-sectional study of a general Danish population 1997
• Longitudinal study of a general Danish population 1997-2003
Longitudinal epidemiological studies

Pool of prevalent cases

incidence rate  

healing rate  

Longitudinal epidemiological studies

Longitudinal study of risk factors

Aims
- Describing the dynamics of AP in a general population
- Identification of individual and tooth-specific factors associated with incidence or persistence of AP in a general population
- Quantification of the risk related to incidence or persistence of AP

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Study population

1997
616 individuals,
16022 teeth

Lost: 143 individuals
lack of time or interest(22),
pregnancy(3), other disease(2),
death(1), unknown(115)

2003
473 individuals,
12329 teeth

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Study population

- 473 (80%) individuals from 1997 received a new radiographic examination in 2003
Longitudinal study of a general Danish population 1997-2003

<table>
<thead>
<tr>
<th></th>
<th>Status 1997</th>
<th>Status 2003</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
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<tr>
<td>Number of individuals</td>
<td>473</td>
<td>41.2</td>
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<tr>
<td>Median number of teeth</td>
<td>26</td>
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<tr>
<td>Individuals with AP</td>
<td>195</td>
<td>41.2</td>
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<tr>
<td>Individuals with root filled</td>
<td>250</td>
<td>52.8</td>
</tr>
<tr>
<td>filled teeth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of teeth</td>
<td>12442</td>
<td></td>
</tr>
<tr>
<td>Teeth with AP</td>
<td>379</td>
<td>3</td>
</tr>
<tr>
<td>Teeth with root filling</td>
<td>621</td>
<td>4.9</td>
</tr>
<tr>
<td>Teeth with root filling and</td>
<td>304</td>
<td>49</td>
</tr>
<tr>
<td>AP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Development of teeth without root fillings 1997-2003

1997

- 11729 Healthy
- 75 AP

2003

- 11406 Healthy (97.6)
- 52 Extractions (0.4)
- 5 Healthy (6.6)
- 29 AP (38.7)
- 9 Rootfilled+Healthy (12.0)
- 14 Rootfilled+AP (18.7)
- 18 Extractions (24.0)

11804 Teeth

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Development of root-filled teeth 1997-2003

1997

618 Rootfilled teeth

314 Rootfilled+Healthy

304 Rootfilled+AP

2003

244 Rootfilled+Healthy (77.9)

61 Rootfilled+AP (19.5)

8 Extractions (2.6)

91 Rootfilled+Healthy (30.0)

177 Rootfilled+AP (58.4)

35 Extractions (11.6)

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Conclusion

• Since the total number of teeth with AP was almost steady, and the number of root filled teeth with AP decreased, more teeth presented with new AP lesions in 2003 than in 1997.

• Time is a crucial factor when success rates in population studies are calculated.

Kirkevang et al. 2006
Risk factors related to presence, incidence, and persistence of AP

Individual-specific risk factors

Tooth-specific risk factors

- The analyses of tooth-specific factors are based on within-mouth comparisons (conditional logistic regression), therefore all results are adjusted for individual-specific factors

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Tooth-specific risk indicators related to presence of AP

- Primary caries
- Secondary caries
- Marginal bone level
- Adequate filling
- Inadequate filling
- Adequate crown
- Inadequate crown
- Pulpal post
- Root filling

Odds ratio relative to healthy tooth

Risk estimates with 95% confidence intervals. All estimates are mutually adjusted.
Tooth-specific risk factors related to incidence of AP

- Primary caries
- Secondary caries
- Marginal bone level
- Adequate filling
- Inadequate filling
- Adequate crown
- Inadequate crown
- Pulpal post
- Root filling

Odds ratio relative to healthy tooth

Risk estimates with 95% confidence intervals. All estimates are mutually adjusted.

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Tooth-specific risk factors related to presence AP

- Too short
- Too long
- Inadequate sealing

Odds Ratio relative to adequate root filling

Open circle: Risk estimates adjusted only for toothgroup+jaw
Closed circle: Risk estimates adjusted for all tooth-specific variables

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Tooth-specific risk factors related to incidence of AP

Open circle: Risk estimates adjusted only for tooth group+jaw
Closed circle: Risk estimates adjusted for all tooth-specific variables

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Tooth-specific risk factors related to persistence of AP

Open circle: Risk estimates adjusted only for tooth group+jaw
(Closed circle: Risk estimates adjusted for all tooth-specific variables)

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Conclusions

Pool of prevalent cases

Risk factors related to incidence
- Crowns, quality
- Fillings, quality
- Caries
- Marginal bone level
- Root fillings

Risk factors related to healing/persistence
- Crowns, quality
- Fillings, quality
- Caries
- Marginal bone level
- Root filling, QUALITY

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Looking for the future ☺

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