Risk of total mortality in relation to type of cigarette smoked

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Date : May 2004

This is an updated version of a review conducted in 2002.

Table 1 summarizes information on the relative risk of total mortality in relation to type of cigarette smoked for 8 studies, all from the USA, UK or Western Europe. Except that the Tang et al., 1995 results include some data considered separately by Hawthorne & Fry, 1978 the studies appear to provide independent data.

The table provides information on:

1. **First author and location** - see references for the full author list;
2. **Study design and period of deaths (or cases)** – all the studies were prospective studies of deaths = P(D);
3. **Comparison and test group** - the comparison group has always been taken as plain rather than filter or the group with the highest tar, nicotine or tar/nicotine (T/N) for which data are available; the test group has conversely always been taken as filter rather than plain or the lowest yield available;
4. **Sex** - some studies only provide results for one sex; one study provided results only for the sexes combined;
5. **Numbers of deaths (or cases)** - the number included in the specific comparison, on occasion estimated approximately;
6. **RR (95% CI)** - the relative risk and 95% CI comparing the last group (numerator) with the comparison group. Where a study provides estimates adjusted for various sets of adjustment factors, RRs and CIs are, if possible, presented (a) adjusted for as many factors as possible including cigarettes/day and (b) adjusted for as many factors as possible excluding cigarettes/day. RRs and CIs are sometimes given by age or other data subset, and have often had to be estimated (see notes);
7. **Adjustment factors** - see key at the end of the table; and
8. **Notes** - see key at the end of the table.
All the studies considered present estimates that are adjusted for age, cigs/day (or in one study pack-years) and possibly other factors also. Of these 16 relative risk estimates, 13 are below 1.00 (7 statistically significantly), and 3 are above 1.00 (none significantly). Omitting the tar estimate from the study by Tang et al., 1995, which is not comparable as it is expressed on a per mg tar reduction basis and would to some extent duplicate the filter/plain estimate, and also the nicotine estimate from the study by Kuller et al., 1991 to ensure all estimates are independent, fixed-effects meta-analysis gives a relative risk estimate of 0.86 (95% CI 0.83-0.89). There is some heterogeneity between these estimates, although this is not statistically significant ($\chi^2 = 23.2$ on 13 d.f., $p = 0.06$). The random-effects estimate is 0.86 (0.82-0.90).

Only three studies provide estimates that are unadjusted for cigs/day. In both these studies the unadjusted RRs are very similar to the adjusted RRs.
<table>
<thead>
<tr>
<th>First author</th>
<th>Study design/ Period of deaths</th>
<th>Comparison group</th>
<th>Test group</th>
<th>RR (95% CI)</th>
<th>Adjusted factors</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hammond et al., 1976 and Lee &amp; Garfinkel, 1981</td>
<td>USA</td>
<td>Low TN</td>
<td>P(D)</td>
<td>1960-72</td>
<td>(1) 0.88(0.82-0.95)</td>
<td>age, cigs, race, age, res, occ, educ, hbl.</td>
</tr>
<tr>
<td>Hoffmann &amp; Fry, 1978, WC Scotland</td>
<td></td>
<td>High TN</td>
<td>P(D)</td>
<td>1968-77</td>
<td>0.80(0.74-0.89)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Lee &amp; Garfinkel, 1981</td>
<td></td>
<td>Migrants, UK/USA</td>
<td>P(D)</td>
<td>1964-77</td>
<td>0.80(0.77-1.03)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Borland et al., 1983</td>
<td></td>
<td>Current smokers</td>
<td>P(D)</td>
<td>1967-77</td>
<td>0.80(0.78-0.92)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Koller et al., 1991</td>
<td></td>
<td>USA</td>
<td>P(D)</td>
<td>1973-85</td>
<td>0.78(0.75-0.81)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Lange et al., 1992</td>
<td></td>
<td>Denmark</td>
<td>P(D)</td>
<td>1976-89</td>
<td>0.75(0.72-0.79)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Tang et al., 1995</td>
<td></td>
<td>4 UK studies</td>
<td>P(D)</td>
<td>1980-90</td>
<td>0.71(0.62-0.80)</td>
<td>age, cigs, age, res, occ</td>
</tr>
<tr>
<td>Woodburn, 2001</td>
<td></td>
<td>Scotland</td>
<td>P(D)</td>
<td>1984-99</td>
<td>0.70(0.62-0.79)</td>
<td>age, cigs, age, res, occ</td>
</tr>
</tbody>
</table>

### Key to adjustment factors

- **age** = age
- **ages** = age started to smoke
- **bmi** = body mass index
- **Bor** = Bortner score
- **bp** = blood pressure
- **car** = beta-carotene
- **chol** = cholesterol
- **cigs** = number of cigarettes per day
- **dur** = duration of smoking
- **educ** = education
- **hhd** = history of heart disease
- **hlc** = history of lung cancer
- **inh** = inhalation
- **occ** = occupation
- **pot** = urinary potassium
- **pyr** = pack-years
- **race** = race
- **rel** = religion
- **res** = area of residence
- **sc** = social class
- **sex** = gender
- **stud** = study
- **tar** = tar yield
- **vitC** = vitamin C
- **vitE** = vitamin E

### Key to notes

- **c** confidence limits estimated from data provided
- **r** relative risk estimated from data provided
- **1** numbers of deaths are "adjusted deaths" as described by Hammond et al., 1976; numbers of deaths and RR (CI) given separately for two periods, (1) 1960-66 and (2) 1966-72
- **2** combined analysis of British population random sample plus sample of siblings of UK migrants to USA
References


