Malignant Pleural Mesothelioma in Bakers and Pastry Cooks

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Background The occurrence of malignant pleural mesothelioma (MPM) among bakers and pastry cooks has never been documented.

Case reports We detected eight cases of MPM in bakers, pastry cooks, and biscuit cooks engaged in making, baking/cooking, and selling pastry/bread in two hospital-based series (Rome and Orbassano/Turin, Italy; period 1990–1997; 222 cases). Field-investigations revealed asbestos-containing material (ACM) in ovens for baking bread, that were manufactured prior to the 1980s.

Conclusions It is suggested that there is a possible new association of the risk of having worked as a baker or pastry cook and MPM. Presumptive source of exposure to asbestos was the use of asbestos-insulated ovens. Am. J. Ind. Med. 40:371–373, 2001. ß 2001 Wiley-Liss, Inc.

KEY WORDS: mesothelioma; ovens; asbestos; bakers; pastry cooks; biscuit cooks

INTRODUCTION

Among bakers and pastry cooks, there is evidence of an excess of respiratory cancers [Tchsen and Nordholm, 1986]. Increased cancer risks have been found for sinonasal [Luce et al., 1992], laryngeal [De Stefani et al., 1998], and lung cancer [Coggon et al., 1986; Carstensen et al., 1988, 1989; Wickiell et al., 1988; De Stefani et al., 1996, 1998].

To our knowledge, malignant pleural mesothelioma (MPM) has never been described in this occupational group. Yet, two distinct hospital-based series of MPM collected in Rome and Orbassano/Turin (Italy) revealed MPM cases in subjects who worked as bakers, pastry cooks, and biscuit cooks. This induced a re-evaluation of a previous observation of a pastry-oven containing asbestos powder in its structure as insulation material [Occhiena et al., 1994], and to thoroughly investigate for the presence of asbestos-containing material (ACM) in ovens for baking bread or other food.

METHODS

Two MPM case-series of Rome and Orbassano/Turin, Italy, (of 124 and 102 cases, respectively; period: 1990–1997) were reviewed to identify subjects who worked as bakers, biscuit and pastry cooks (unique, main or relevant occupation, for at least 1 year). Basic data were derived from current clinical records, while a supplement of occupational inquiry was conducted whenever possible by interviewing the patients or their next-of-kin.

The diagnosis of MPM was based on clinical presentation, radiographic findings, gross morphology, and characteristic histology on thoracoscopic/thoracotomy biopsy specimens coupled with consistent immunohistochemistry, using a panel of monoclonal/polyclonal antibodies against cytokeratin, vimentin, Leu-M1 (CD15), Ber-EP4, CEA, HBME-1, EMA, and calretinin. An index of certainty (definite, probable, and possible) was used to classify each MPM case [Henderson et al., 1992].

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On-site investigations were conducted in the Orbassano/Turin area by examining industrial and artisanal baking ovens and collecting historical data about their construction. In addition, samples of insulating materials collected from several ovens were analyzed for their mineral content.

RESULTS

MPM Cases

Overall, eight cases of definite MPM were identified in subjects who worked as professional bakers, biscuit cooks and pastry cooks. In none of the subjects was there a radiological/pathological sign of pulmonary asbestosis or pleural hyaline plaques. Relevant data regarding the patients are summarized in Table I.

Subject 1 reported that the biscuit factory in which he worked consisted of a single, wide, dusty room. He carried the meal bags, prepared the biscuit-dough and loaded/unloaded an oven ‘insulated with asbestos and rock-wool’. At the opening of the oven the air was dusty with dispersal of ‘fibers’.

Subject 2 defined himself as ‘sifter/maker’. He carried the meal bags, sifted the meal, and placed the bread-dough into the oven. The patient reported that from the oven opening ‘fibers came out’.

Subject 3 worked in five different retail bakeries as artisan bread baker.

Subjects 4, 5, and 6 were three sisters who worked in the same artisanal bakery at different times, preparing and baking the pastry-dough, and selling baked goods. We note that these women belong to a previously described cluster of familial MPM [Ascoli et al., 1998], in whom a genetic background might have increased susceptibility for tumor development.

Subjects 7 and 8 carried the meal bags, prepared the bread-dough, loaded/unloaded the oven, and often raked insulating materials at the top of the oven.

Field Investigation on Ovens

The actual ovens used by these workers are not available any more but ACM was found in several ovens manufactured in Italy prior to the early 1980s in the forms of:

1. Unbound powder (generally chrysotile, occasionally mixed with vermiculite and/or glass fibers and/or rock wool) filling the space between external walls (brickwork or metal) and internal chambers for raising and cooking. The oven top often remained uncovered to allow moisture to evaporate. Bakers reported they had to scrape the incrustation which periodically formed on the top, by powder agglutination. For this operation they used rakes or similar tools. Yet, main dust dispersion occurred when the oven was moved to another site because the interstice had to be emptied and re-filled with insulation material.

2. Ropes (usually chrysotile or amosite, mixed with a variable amount of cotton and nylon fibers) used as sealing of the oven wickets. Rubbing and gradual burning of the non-asbestos components progressively led to a loss of cohesion of the ropes, with release of asbestos fibers.

TABLE I. Cases of Pleural Mesothelioma in Bakers and Pastry Cooks

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age</th>
<th>Year of diagnosis</th>
<th>Histology</th>
<th>Job titleb</th>
<th>Years</th>
<th>Duration of employment</th>
<th>Workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>75</td>
<td>1997</td>
<td>Epithelial</td>
<td>Biscuit cook</td>
<td>1948–86</td>
<td>32</td>
<td>Biscuit factory</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>73</td>
<td>1995</td>
<td>Epithelial</td>
<td>Artisan bread baker</td>
<td>1939–82</td>
<td>43</td>
<td>Retail bakeries</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>65</td>
<td>1992</td>
<td>Biphasic</td>
<td>Artisan bread baker</td>
<td>1947–85</td>
<td>38</td>
<td>Retail bakeries</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>58</td>
<td>1987</td>
<td>Epithelial</td>
<td>Pastry cook/Pastry shop-girl</td>
<td>1941–74</td>
<td>33</td>
<td>Retail bakeries</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>66</td>
<td>1996</td>
<td>Sarcomatous</td>
<td>Pastry cook/Pastry shop-girl</td>
<td>1943–60</td>
<td>17</td>
<td>Retail pastry-shops</td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>53</td>
<td>1988</td>
<td>Epithelial</td>
<td>Pastry cook</td>
<td>1948–65</td>
<td>17</td>
<td>Retail pastry-shops</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>59</td>
<td>1993</td>
<td>Epithelial</td>
<td>Baker</td>
<td>1946–49</td>
<td>3</td>
<td>Retail bakeries</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>52</td>
<td>1994</td>
<td>Epithelial</td>
<td>Baker</td>
<td>1960–72</td>
<td>12</td>
<td>Retail bakeries</td>
</tr>
</tbody>
</table>

*Cases 1–6 are from Rome, 7 and 8 from Orbassano/Turin.

*All subjects denied other relevant occupations with possible exposures nor other potential sources of asbestos.

*Including the family-owned craftsman artisan pastry-shop [Ascoli et al., 1998].

*The same biscuit factory.
3. ‘Cardboard’ (just pressed chrysotile fibers, without bindings and non-asbestos fillers) used as shelters against flames and heating. The workers, who clipped out the desired shapes with scissors, manufactured most of these devices. Significant powder release resulted for minimal mechanical trauma because of the very low cohesiveness of this material.

4. Plates and small boards of a rigid mix of chrysotile and resins used in tunnel-ovens as loading-platforms and rolling-tapes, respectively. This material substantially released no asbestos fibers in normal operating conditions. On the other hand, it generated a lot of dust when sawed or pierced with drilling-machines, or crushed at the moment of its removal.

**DISCUSSION**

The occurrence of MPM in bakers and pastry cooks that we have reported here is, to our knowledge, a new finding. So far, these workers have been associated with increased risks for respiratory tract cancer being potentially exposed to as-yet-undefined hazardous agents prevalent in small retail bakeries [Coggon et al., 1986; Wicksell et al., 1988]. We hypothesize that MPM development might be attributed to the presence of uncovered ACM in ovens.

It has become clear that occupations at risk for MPM attributable to unusual asbestos exposure and/or activities with likely contact with in place ACM continue to expand. A link between bakers/pastry cooks and asbestos and MPM in our cases is sustained by these observations: (i) MPM by itself is regarded as sentinel event of previous asbestos exposure; (ii) the latency period between presumed initial exposure to asbestos and development of MPM was 30 years or more (mean 46.62), with a high stability within the occupation as baker/pastry cook (unique and longer than 10 years in seven out of eight subjects); (iii) four patients self-reported exposure to asbestos and other fibrous components in ovens (primarily as insulating material in their structure) and release of fibers; (iv) we gathered evidence of pastry-ovens containing asbestos powder as insulating material in their structure and the use of a variety of ACM in the forms of cardboard, slabs, and ropes; (v) other potential sources of exposure for these workers were not identified. Interestingly, scattered information is available from the Australian Mesothelioma Register listing three cases in which the circumstance of asbestos exposure (with no other exposure) is reported as ‘bakery (ovens)’ [Leigh et al., 1999], and from a case-referent study indicating the association between bakers and asbestos and the risk of lung cancer [De Stefani et al., 1996]. In addition, two further MPM cases (Rome series) who were professional cooks in the early 1950s (rotisserie and restaurant kitchen), could hypothetically be justified by a similar presence of ACM in ovens.

In Italy, the manufacture of asbestos-containing ovens was active until early 1980s but field-investigations in mid-1990s revealed similar equipment still in use (asbestos was banned for trading and use in the early 1990s: law 257/92). Asbestos has been gradually substituted with bentonite or man-made mineral fibers, as the result of routine oven maintenance of thermal insulation material. It seems likely that ACM was used and removed without any preventive caution, so that there appears to have been a potential for occupational exposure to asbestos of bakers and pastry cooks in the past. We consider it useful to carry out controls in old ovens in order to reveal, seal, or remove dangerous ACM, if present. This is the first study that investigated the possible source of asbestos exposure among bakers/pastry cooks with MPM. More studies are necessary, however, to validate the association of bakers/asbestos exposure and the MPM risk in this occupational group.

**REFERENCES**


