Home accidents associated with anosmia

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Summary

Objective > To assess the risk of home accidents related to severe hyposmia.
Methods > A questionnaire, completed by 57 hyposmic patients and 49 control subjects with a normal sense of smell, asked about four specific types of olfactory-related home accidents: undetected fires, undetected gas leaks, consumption of spoiled food, and incidents of food burning. Level of olfactory function was determined by olfactory testing (Biofa®).
Results > Olfactory testing revealed that 60% of the patients were anosmic and 40% had severe hyposmia. They reported cooking-related accidents most often (63%), followed by eating spoiled food (51%), inability to detect a gas leak (47%) and inability to smell a fire (26%). All these accidents were significantly more frequent than in the control population (p < 10^-4).
Discussion and conclusion > This paper, the first in the European literature and the second in the international literature, shows that patients with severely impaired olfaction are more likely to experience related accidents than those with normal olfactory function.
Two studies have estimated the frequency of olfactory disorders in the United States. In 1989, National Geographic sent a brief test of sense of smell to its subscribers worldwide. The results from 1.2 million subjects indicated that approximately 1% of subscribers had olfactory problems. \(^1\) In 1998, the US National Institutes of Health (NIH) published the results of a survey of 42,000 people that it estimated the prevalence of olfactory problems in the American population at 1.4% (2.7 million). At the same time, 1.1 million Americans complained of a problem with their sense of taste (0.6%) \(^2\). Transposing these figures to the French population, we can estimate that more than 900,000 persons in France may have a problem perceiving smells.

Although numerous scientific papers have been published over the past 30 years on the pathophysiology, diagnosis and treatment of the varied causes of dysosmia \(^3\), studies of its practical consequences are rare. One study showed a substantial risk that dysosmic subjects may not be alerted to the presence of fire or gas leaks \(^4\). Kitchen accidents (burnt food, failure to detect spoiled food) are reported in nearly 45% of dysosmic patients.

We evaluated the practical consequences of the loss of a sense of smell in patients with a severe olfactory impairments, by assessing the prevalence of home accidents among them.

**Methods**

The study included two groups:  
- a control group of consecutive patients consulting an otorhinolaryngologist for a problem unrelated to smell or any other sinonasal disease;  
- a group of consecutive patients consulting for severe dysosmia. The outpatient clinic for olfactory disorders of Georges Pompidou European Hospital treats patients with a variety of these complaints — quantitative (hyposmia or anosmia) and quantitative (cacosmia, parosmia, phantosmia). This study included only patients with anosmia or severe dysosmia (olfactory loss exceeding 80%). Patients were selected by the physician performing the consecutive consultations.

All the subjects were given an anonymous questionnaire that could be completed in less than 2 min before the consultation. It included sex, age, and 4 questions about detection of fire, gas leaks, and food risks: 

- Does an impaired sense of smell prevent you from identifying the smoke from a fire?
- Does an impaired sense of smell prevent you from identifying a gas leak?
- Do you often burn food while cooking?
- Does an impaired sense of smell prevent you from identifying spoiled food?

If the response to the last question was positive, an additional question was asked: Have you ever had food poisoning?

The dysosmic patients then had a consultation for the olfactory disorder. Olfactory assessment used the Biolfa\(^\text{®}\) test (Ampillion, Paris, France) \(^5\). This test uses 2 series of opaque flasks that contain calibrated solutions of chemicals with different smells. The first series provides a quantitative test to assess the subjects’ olfactory thresholds; the second is a semiquantitative test to explore olfactory acuity more broadly with a more varied panel of solutions. The “quantitative” test was performed with 3 chemicals (eugenol, aldehyde C14 and phenylethyl alcohol), all stable over time, soluble in water, nontoxic and producing stimulation that is essentially olfactory and not trigeminal. These solutions were presented in 9 increasing concentrations. The “semiquantitative” test included 8 chemicals with different smells, at 4 concentrations for each. The odors tested were lemon grass (citronella), cut grass, mint, peach, mushrooms, vanilla, clove, and horse dung. According to published standards, patients may be classified as anosmic, severely or moderately hyposmic, or normosmic \(^5\). The presence of parosmia (the perception of an unpleasant olfactory experience, such as a burn odor or feces odor, when a normal odor is being presented) was systematically sought \(^6\). After an etiological work-up (history, neurological and ORL examination including fibroscopy, CT of the paranasal sinus in axial and coronal slices without contrast product, and cerebral MRI), the cause of the dysosmia was determined \(^4,7\). No olfactory test was performed in the control subjects.

**Results**

The control group included 49 subjects: 30 women and 19 men, with a mean age of 53.7 years (standard deviation (SD) 13.5). The group of dysosmic patients included 57 subjects — 37 women and 20 men with a mean age of 58.9 years (SD: 15.8). The groups did not differ significantly in sex ratio or age.
Dysosmia assessment

In dysosmic patients (n = 57), time since onset of dysosmia averaged 83 months (SD: 137 months). Parosmia was noted in 17 patients (30%). The principal causes were post-rhinitis dysosmia (n = 27, 47% of the dysosmic population), sinonasal polyposis (n = 10, 18%) and head trauma (n = 8, 14%). Several rarer causes were observed: dysosmias that were congenital (n = 2), postoperative (n = 1), age-related (n = 2) and idiopathic (n = 7).

Using the results of the olfactory tests (table I), we classified the patients as anosmic (n = 34, 60% of the population) or severely hyposmic (n = 21, 40%).

Complications associated with dysosmia

We began by assessing the frequency for each subject of each of the four events (failure to detect fire, gas leak, or spoiled food, and burning food often while cooking). In the control population, six subjects reported at least 1 of these 4 events (12.2% of the control subjects) and in the population of dysosmic subjects, 46 patients (80.7%, p < 10^-4).

The failure to detect burning smells during a fire was reported by 15 dysosmic patients (26% of the patients) and none of the controls (p < 10^-4). The failure to detect a gas leak was noted by 27 dysosmic patients (47%) and a single control subject (2%, p < 10^-4). Thirty-six dysosmic patients (63%) and two control subjects (4%) (p < 10^-4) reported that they burned food frequently while cooking. The failure to detect spoiled food was noted by 29 dysosmic patients (51%) and 5 control subjects (10%) (p < 10^-4). Finally, 5 dysosmic patients had had food poisoning because of this failure to detect spoiling (9%) compared with a single control subject.

Discussion

This study is the first in Europe and only the second internationally to examine the major risk of home accidents in subjects with anosmia and severe hyposmia.

The percentages of accidents that we observed were higher than those described in the only other study of this topic [4]. In a series of 445 patients who attended a clinic specialized in olfactory impairments in Virginia (United States), 7% had not identified a fire, 23% a gas leak, 25% spoiled food and 45% food burning during cooking. The percentages we observed are higher by a factor of 1.4 for burning food, by a factor of 2 for not noticing spoiled food or gas leaks, and by a factor of 3.7 for not detecting a fire. Our population included only patients with no or only very limited olfactory capacities, as shown by the results of their olfactory assessment (table I). In the study by Santos et al [4], the population included patients with diverse degrees of olfactory impairment (from anosmia to moderate hyposmia). Only 30% of the patients were anosmic. Of those who reported at least one home accident, the authors reported that 45% were anosmic and 34% severely hyposmic. The percentage of patients with moderate hyposmia in that study was therefore relatively large. These variations in the distribution of the diverse degrees of hyposmia in our study and in this reference study [4] explain the differences observed in the percentages of accidents.

Our study is the first of this type to include a control group. The constitution of this control group with a sex ratio and mean age identical to that of the case group made it possible to demonstrate the considerable difference in accident risks. The distribution of accidents in the 2 groups was very significant (p < 10^-4).

This updated study of the high frequency of household accidents in patients with hyposmia or anosmia is especially important in view of the elevated frequency of dysosmia in the population. The frequency of dysosmia varies according to the age of the study population. Important studies have examined the aging of the sense of smell: half of all subjects aged 65-80 years and 75% of those older than 80 years have severe hyposmia or anosmia [8]. High frequencies of post-rhinitis (one of every 400 cases of acute rhinitis) and posttraumatic (5% of head injuries) dysosmia and of sinonasal polyposis (prevalence between 4 and 6% of the population of western Europe) are also observed in the literature [3].

Diagnosis is based on specific questioning that makes it possible to discover the precise nature of the dysosmia (quantitative or qualitative, that is, parosmia, phantosmia, or cacosmia), the circumstances of onset and its course. Conventional ORL and neurological examinations and fibroscopy of the nasal cavities follow. Additional examinations may be requested depending on the clinical data: CT of the sinonasal cavity in axial and coronal slices without injection of contrast product if a rhinological cause is suspected, cerebral MRI in the rare cases of a suspected intracranial tumor, especially an olfactory meningioma (0.5% of all causes). Four causes account for more than 90% of cases of dysosmia: chronic sinonasal damage, mainly sinonasal polyposis, head trauma, acute rhinitis and aging. The other causes are rare, with a prevalence rarely exceeding 1%. Treatment of

Table I

Results of olfactory tests in 57 dysosmic subjects

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Normal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative test (detection threshold for 9 concentrations presented)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eugenol</td>
<td>0.7</td>
<td>1.4</td>
<td>9</td>
</tr>
<tr>
<td>Aldehyde C14</td>
<td>0.7</td>
<td>1.5</td>
<td>9</td>
</tr>
<tr>
<td>Phenylethyl alcohol</td>
<td>0.8</td>
<td>1.7</td>
<td>9</td>
</tr>
<tr>
<td>Semiquantitative test (8 chemicals with smells)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of smells detected</td>
<td>3.1</td>
<td>3.6</td>
<td>8</td>
</tr>
<tr>
<td>Number of smells identified</td>
<td>0.9</td>
<td>1.7</td>
<td>8</td>
</tr>
</tbody>
</table>

The means observed show very profound olfactory impairment.
Dysosmia is possible only when its causes are sinonasal. There is no effective treatment when the causes are sensorineural (head trauma, acute rhinitis acute, or aging). The medical work-up for dysosmia consists in ruling out serious causes (tumor or neurological disease), screening for a curable cause (chronic sinonasal condition) and of informing patients of the daily risks they face at home. Prevention of such risks can be suggested to the patient: giving up use of gas, installation of a smoke detector, increased vigilance when using fires or while cooking.

Conflicts of interest: none

References


