Gastrointestinal Symptoms after oral Ingestion of Cleaners and Cosmetic Products Containing Surfactants: Results from a Prospective Multicentre Study in Germany

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Objective

Cleaning and cosmetic products containing anionic and non-ionic surfactants are considered to be of low toxicity.

Oral exposure generally causes limited gastrointestinal irritation.

One objective of this study was to evaluate the frequency and severity of gastrointestinal symptoms.

We reported about the respiratory injuries before [Färber E et al Clin Tox 2011. 49: 249]
Methods

Prospective observational study. Follow-up by telephone interview based on a detailed questionnaire.

Inclusion criteria
- Confirmed oral exposures of soaps, shampoos, bath additives, general purpose cleaners, laundry detergents or manual dishwashing detergents
- Approval of study participation

Exclusion criteria
- Co-ingestions
Results

991 cases registered
146 cases excluded
240 cases lost to follow-up
605 cases included

Causes of ingestion: Unintentional 591, intentional 8, unknown 6

Amount (of original product) ingested: 0.2 - 600 mL, Median 3 (IQR 3-5)

Figure 1: Age groups (0.13–98 years old)
Gastrointestinal Symptoms

258 patients developed gastrointestinal symptoms.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Symptomatic</th>
<th>Asymptomatic</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>210</td>
<td>330</td>
<td>540</td>
</tr>
<tr>
<td>&gt;18 Years Old</td>
<td>48</td>
<td>17</td>
<td>65</td>
</tr>
<tr>
<td>Sum</td>
<td>258</td>
<td>347</td>
<td>605</td>
</tr>
</tbody>
</table>

Table 1: Number of patients displaying gastrointestinal symptoms
Chi-square test: $p < 0.001; \chi^2 = 28.986$
Gastrointestinal Symptoms

- Flatulence
- Lack of appetite
- Abdominal pain
- Belching
- Diarrhoea
- Choking
- Foaming
- Slight cough
- Nausea and/or vomiting

[Bar chart showing the severity of various gastrointestinal symptoms, with Nausea and/or vomiting having the highest severity]
Onset of gastrointestinal symptoms

Symptoms were of minor severity in 219 cases (93%).

In cases with moderate severity symptoms lasted >= 4 h; most frequently diarrhoea (20), abdominal pain (6), and nausea/vomiting (6).
## Hospitalized patients

<table>
<thead>
<tr>
<th>Age [y], sex</th>
<th>Cause of ingestion</th>
<th>Product Group</th>
<th>Clinical findings</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>66, f</td>
<td>accidental</td>
<td>general purpose cleaner, 70mL</td>
<td>Slight cough; initial. Vomiting initial, Difficulties in swallowing after 5 min. Laryngitis with aphonia, for 2 days.</td>
<td>Hospitalization in ENT clinic for 4 days</td>
</tr>
<tr>
<td>70, f</td>
<td>suicidal</td>
<td>general purpose cleaner, 400mL</td>
<td>Nausea. Diarrhoea after 8 h for several days, followed by dehydration and acute renal failure.</td>
<td>Hospitalization for 2 weeks</td>
</tr>
<tr>
<td>98, f</td>
<td>accidental, dementia</td>
<td>laundry, detergent, &gt;1 swallow</td>
<td>Nausea, short vomiting. Diarrhoea developed after 8 h followed by dehydration.</td>
<td>Hospitalization for 1 week</td>
</tr>
<tr>
<td>67, f</td>
<td>accidental</td>
<td>laundry detergent, 1 spoonful</td>
<td>Slight cough. Nausea for one day, foamy smooth stool (0.5- 2 days), abdominal pain (4 days). Fibrinous oesophagitis in lower one-third of the oesophagus.</td>
<td>Hospitalization for 1 week</td>
</tr>
</tbody>
</table>
# Angioedema-like symptoms

<table>
<thead>
<tr>
<th>Age [y], sex</th>
<th>Cause of ingestion</th>
<th>Product Group</th>
<th>Clinical findings</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>85, f</td>
<td>accidental, nursing home</td>
<td>chewing a bar of hand soap</td>
<td>Reddening &amp; swelling of mouth, tongue, and lips within 30 min. Pain of tongue within 20 min. Symptoms resolved after 2 days.</td>
<td>Supportive</td>
</tr>
<tr>
<td>71, f</td>
<td>accidental, dementia</td>
<td>1-2 bites of a bar of hand soap</td>
<td>Massive swelling of the tongue within; intake of food not possible, difficulties in swallowing, Blisters on the lips.</td>
<td>Hospitalization for 5 days</td>
</tr>
<tr>
<td>84, f</td>
<td>accidental, dementia</td>
<td>chewing a bar of hand soap</td>
<td>Difficulty in swallowing for &gt;1 h. Swelling and pain of tongue and lips. Pain lasted for 2 h.</td>
<td>Hospitalization Glucocorticoids i.v.</td>
</tr>
<tr>
<td>80, f</td>
<td>accidental, dementia</td>
<td>chewing a bar of hand soap</td>
<td>Painless swelling and reddening of lips within 30 min. Symptoms lasted 1 day.</td>
<td>Supportive (local cooling)</td>
</tr>
</tbody>
</table>
### Product’s group related toxicity

<table>
<thead>
<tr>
<th>Product groups</th>
<th>symptomatic</th>
<th>gastrointestinal symptoms</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household cleaners</td>
<td>180</td>
<td>161</td>
<td>341</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>167</td>
<td>97</td>
<td>264</td>
</tr>
<tr>
<td>sum</td>
<td>347</td>
<td>258</td>
<td>605</td>
</tr>
</tbody>
</table>

Chi-square test: $p <0.01; \chi^2 = 6.671$

A higher percentage of patients displayed gastrointestinal symptoms after ingestion of household cleaners (47.2%) than after intake of cosmetics (36.7%).
Discussion

Cosmetic products containing surfactants are preparations for application only on the external parts of the human body f. e. to clean skin and hair (e.g. soap, shampoo).

They should be less irritant than household cleaners.

This hypothesis may explain the differences in frequency of gastrointestinal symptoms observed in this study.
Discussion

Caustic oesophageal lesions caused by liquid laundry detergents similar to our case had been reported only once before from France: After ingestion of washing machine liquid detergent capsules caustic lesions developed in 2 out of 382 cases [1].

Angioedema-like symptoms after chewing hand soap bars were observed in seniors only (>70 yo), not reported before.

Conclusion

Gastrointestinal symptoms occurred in nearly half of all patients. They were minor and of limited nature in most cases.

Household cleaners induced significantly more frequent GI-symptoms than cosmetics. Adults and elderly persons developed significantly more frequently gastrointestinal symptoms than children.

Especially seniors developed complications like dehydration, fibrinious esophagitis or angioedema-like symptoms. This might reflect a greater vulnerability of the elderly to the irritant effects of anionic and non ionic surfactants.
Acknowledgements

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