Extremely Elevated Relative Risk of Paraffin Lamp Oil Exposures in Orthodox Jewish Children

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ABSTRACT. *Background.* **In observance of the Sabbath and other religious holidays, many Orthodox Jews maintain a burning lamp that uses paraffin lamp oil as fuel. Unintentional pediatric exposure to paraffin lamp oil, a hydrocarbon, is typically by ingestion and carries a risk of aspiration with subsequent pneumonitis. This investigation was prompted by an apparent increase in paraffin lamp oil exposures during the Jewish Sabbath, from sunset Friday until sunset Saturday, noted by the staff of our regional poison control center.**

Objective. **In this investigation, we retrospectively reviewed all exposures to paraffin lamp oil occurring in our large city in children <18 years old reported to our regional poison control center between January 1, 2000, and February 1, 2003. Reports were investigated to ascertain the frequency of occurrence of paraffin lamp oil exposures on the Jewish Sabbath and Jewish religious holidays. Caregivers of involved children were surveyed by telephone to determine the exposed child's religion and circumstances of exposure.**

Results. **During these 25 months, 45 cases met inclusion criteria, and all were ingestions. Orthodox Jews accounted for 32 cases (71%), 4 cases (9%) occurred in children who were not Orthodox Jews, and demographic data were unavailable in 9 cases (20%). Twenty-four cases (53%) occurred within 10 hours before or during the Jewish Sabbath or Jewish religious holidays. The relative risk of Orthodox Jewish children to ingest paraffin lamp oil, calculated by using census data, is 374 times that of other children.**

Conclusions. **Public health authorities and caregivers of Orthodox Jewish children should be cognizant of this phenomenon. Educational efforts directed toward both Orthodox Jews and the general public aimed at preventing paraffin lamp oil exposures are warranted.** ***Pediatrics*** **2004;113:e377–e379. URL: http://www.pediatrics.org/cgi/content/full/113/4/e377;** ***paraffin, lamp oil, hydrocarbon, ingestion, poisoning, Sabbath, Orthodox, Jew.***

As part of religious observance on the Sabbath and other religious holidays, "Orthodox" Jews strictly adhere to religious law and maintain a burning flame.[1]

Paraffin lamp oil, a low-viscosity hydrocarbon, is used often as fuel in candles and lamps lit on Jewish holy days. Paraffin lamp oil has properties similar to many other hydrocarbons, imparting particular risk of aspiration when this substance is ingested. Subsequent to aspiration, hydrocarbons may cause pneumonitis and respiratory distress, even leading to respiratory failure.[2,3]

METHODS

We conducted a retrospective review of human exposures to paraffin lamp oil in patients <18 years old reported to our regional poison control center, the only poison control center serving New York City. This review was followed by telephone survey of the parents and caregivers of exposed children. We sought to ascertain the frequency of paraffin lamp oil exposures on the Jewish Sabbath and Jewish religious holidays, determine whether Orthodox Jewish children have elevated relative risk for exposure to paraffin lamp oil, and describe the symptoms and clinical course of paraffin lamp oil poisoning in these patients.

The New York City Department of Health Institutional Review Board deemed the protocol for this investigation exempt from review. Computerized records (Toxicall, Aurora Springs, CO) of all telephone reports made to our poison control center between January 1, 2000, and February 1, 2003, were reviewed, and exposures to paraffin lamp oil were evaluated with regard to time of exposure, demographic group exposed, circumstances of exposure, symptoms, evaluation by a health care provider, and hospital visit and admission.

"Exposure" was defined by using a standardized criteria including known or suspected contact to the product by the following routes: ingestion, inhalation, nasal inhalation, aspiration with ingestion, ocular, dermal, parenteral, rectal, otic, vaginal, other, and unknown.

Telephone contact was made with parents or caregivers of exposed children, and they were surveyed by using a structured questionnaire. An investigator fluent in English and Hebrew conducted the telephone surveys. Participants who responded that the involved child was Jewish were asked specifically whether the child was an Orthodox Jew.

Relative risk is calculated by using only the exposures for which religious demographic data are available. There are ~1.94 million children <18 years old living in New York City.[4] A comprehensive study of New York City Jews estimates that 40 600 Orthodox Jewish children <18 years old live in New York City.[5] The relative risk is calculated as the number of exposures in Orthodox Jewish children/total number of Orthodox Jewish children relative to the number of exposures in all non-Orthodox Jewish children/total number of non-Orthodox Jewish children.

RESULTS

Forty-five cases meeting inclusion criteria were reported. Males accounted for 22 of 45 cases (47%). Excluding 1 outlier who was 7 years old, the age range of children involved was 10 months to 4 years, with a mean age of 21 months. Orthodox Jews accounted for 32 of 45 cases (71%), 4 of 45 cases (9%) occurred in children who were not Orthodox Jews,

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and religious demographic data were unavailable in 9 of 45 cases (20%). Regarding time of occurrence, 24 of 45 cases (53%) occurred within 10 hours before or during the Jewish Sabbath or Jewish religious holidays. The purpose of paraffin lamp oil use in households mirrored religion exactly: All Orthodox Jewish households stated that the sole use of paraffin lamp oil was for religious use, and all households of exposed children who were not Orthodox Jews used paraffin lamp oil in lamps for nonreligious purposes.

All cases were exposure by ingestion and henceforth are referred to as such. Regarding symptoms, 15 of 45 (33%) patients had symptoms subsequent to ingestion. Of these, 13 of 15 (87%) experienced cough, 3 of 15 (20%) experienced lethargy or somnolence, and 2 of 15 (13%) experienced vomiting. Regarding medical care, 21 of 45 patients (46%) were examined by a health care provider, 4 of 45 (9%) were evaluated by their private medical doctor by telephone only, and 20 of 45 (44%) received no known evaluation by a health care provider. Of the patients examined by a health care provider, 1 of 21 (5%) was evaluated in a private medical office, and 20 of 21 (95%) were evaluated in a hospital. Of patients receiving hospital care, 13 of 20 (65%) were evaluated in an emergency department and released after observation, and 7 of 20 (35%) were admitted to the hospital. Of admitted patients, 6 of 7 (86%) were admitted to intensive care units, and 1 of 7 (14%) was admitted to a general pediatric floor in a hospital that lacked a pediatric intensive care unit. Of patients admitted to a hospital, 2 of 7 (29%) required treatment for >1 day in an intensive care unit, and 1 of 7 (14%) was endotracheally intubated and mechanically ventilated. There were no fatalities.

The risk of paraffin lamp oil ingestion for Orthodox Jewish children relative to all other children, calculated from the 36 ingestions in patients for whom religious demographic data are available, is as follows: the risk of ingestion in Orthodox Jews (32 of 40 600) relative to the risk of ingestion in all other children (4 of 1 900 000), totaling 374, with a 95% confidence interval.

DISCUSSION

Orthodox Jewish children seem to have an extremely high relative risk of paraffin lamp oil ingestion. Although children who are not Orthodox Jews may be exposed to paraffin lamp oil, such ingestions seem uncommon.

These paraffin lamp oil ingestions occur most commonly on Jewish religious holy days. Other investigators have described an increase in other poisonings or injury coinciding with Jewish religious holidays.[6,7]

Telephone reporting of paraffin lamp oil ingestion by Orthodox Jews occurs in a manner that likely results in underreporting of this phenomenon. Jewish religious law explicitly prohibits the use of electricity or electronic devices, including telephones, on holy days, although medical emergencies allow exceptions to this prohibition. In circumstances under which Orthodox Jews do report poisoning by telephone on a holy day, their use of a telephone for medical contact is limited to only what is medically necessary, and they may not converse long enough to provide full demographic data about their child.

Unintentional poisoning from liquid fuels accounts for ~2.5% of all unintentional poisoning exposures among children <6 years old.[8] The chemical characteristics of paraffin lamp oil impart a specific risk for aspiration when this substance is ingested.[9] Thorough discussion of the pathophysiology and treatment of hydrocarbon aspiration is beyond the scope of this report but is available in several sources.[10,11]

Paraffin lamp oil has been identified as a particular public health problem and poisoning hazard for children in the United Kingdom,[12] Germany, Denmark,[13] Switzerland,[14] and Belgium.[15] The US Poison Prevention Packaging Act of 1970[16] requires that paraffin lamp oil be dispensed in child-resistant packaging. Our experience, as well as that of other investigators, is that unintentional pediatric ingestions of paraffin lamp oil occur when the substance is transferred out of its original packaging. Lamps that burn paraffin lamp oil as fuel have a "wick" that is actually a hollow tube similar to a straw that dips into the reservoir holding the fuel. Children may drink paraffin lamp oil directly from an unlit lamp. In addition, New York City vendors of paraffin lamp oil frequently sell small plastic dispensing vessels used to transfer the oil from its original container into lamps. These dispensing vessels possess a long, thin nozzle that resembles a drinking straw and presents another risk for children.

All poisoning is preventable, and these paraffin lamp oil ingestions are no exception. The use of a paraffin-burning lamp rather than a standard candle is not required by any Jewish religious rule. Choosing to use paraffin lamp oil rather than a standard candle is done for convenience, esthetics, and possibly for other reasons. Although paraffin lamp oil use is elective, we are in no position to make a recommendation that this religious group discontinue use of paraffin lamp oil. However, we do strongly urge that poison-prevention education be directed toward Orthodox Jews to address the issue of paraffin lamp oil ingestions. Orthodox Jews rely heavily on their religious leaders for guidance in nonreligious matters, and we suggest that this poison-prevention planning and implementation should optimally involve Orthodox Jewish rabbis and community leaders.

Although the number of Orthodox Jewish communities with populations >10 000 existing outside of Israel is few, Orthodox Jews live in communities throughout the world. Public health authorities as well as caregivers of Orthodox Jewish children should be cognizant of this phenomenon and take steps to prevent these ingestions.

The limitations of this study include its retrospective nature, its reliance on patients, caregivers, and health care providers to contact or consult our poison control center after ingestion, and the inability to confirm that any reported ingestion directly involved paraffin lamp oil.

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