Poison Exposure in Children before Passover

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Abstract

Background: Extensive cleaning of homes in Israel before Passover may result in increased exposure of children to cleaning substances.

Objectives: To evaluate the potential danger of Passover cleaning to children, and to study the risk factors in order to identify areas for prevention.

Methods: All cases of poison exposure in Jewish and Arab children under the age of 15 years reported to the Israel Poison Information Center during 1990–95 (n= 5,583) were analyzed for the 6 weeks before and 6 weeks after Passover. Poison exposures in Jewish children <15 years old were studied in seven pediatric emergency rooms for the 2 weeks before and 6 weeks after Passover (n=123).

Results: The IPIC data showed a highly significant 38% increase in the average weekly poison exposure rate for the 2 weeks before Passover compared with the remaining 10 weeks. Data recorded by the pediatric emergency rooms showed a twofold increase in cleaning substance poisoning during the 2 weeks before Passover compared with the following 6 weeks. The rise in exposures to cleaning substances was observed among children from secular, religious and ultra-orthodox families. In these exposures, the substance was found in open containers in 70% of cases.

Conclusions: The extensive cleaning of homes among Jewish families in preparation for Passover poses the danger to young children of cleaning substance poisoning. Increasing public awareness, closer observation of children, and keeping these substances in closed containers should increase children's safety during this annual cleaning.

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Unintentional poisoning is frequent in children, with a peak incidence in preschool children. The Toxic Surveillance System of the American Academy of Poison Control System reported 1,024,889 cases of poison exposure in children under 5 years of age during 1997, which represents 50.3% of the total number of human poison exposures. Cleaning substances were the most common substance category in adults, and ranked second in preschool children with 129,346 cases annually [1].

Poison exposure is subject to minor fluctuations throughout the year. In the USA, higher volumes of consultations at poison centers were observed in the warmer months (up to 6,396/day in June) compared with 5,387 consultations per day in December [1]. However, for young children, the Christmas holiday is associated with the "holiday hazard" of higher exposures to toxic plants and Christmas decorations [2]. In Israel, extensive cleaning of homes is done in most Jewish homes before Passover, with vast use of cleaning substances such as soaps, detergents, bleach, scale remover, and oven cleaners. This pre-Passover cleaning is stricter in religious and ultra-orthodox families, but is undertaken by all segments of the Jewish population. The cleaning often includes rearrangement of kitchens, bathrooms and living rooms. Moreover, since the Passover vacation for public schools and the preschool education system begins a week before Passover, young children are often at home during the cleaning. Thus the pre-Passover vacation period represents a potential hazard of exposure to cleaning substances for young children and housewives. It is our impression that unintentional poison exposures, particularly with these substances, are more frequent during this period, but this observation has not been previously studied.

We undertook this study to evaluate the potential hazard to Jewish children of poison exposure before Passover, to analyze the epidemiology, and to learn of the circumstances of poison exposure in children before Passover, in order to identify areas for prevention.

Methods

The Israel Poison Information Center provides 24 hour service on poison information and consultation nationwide. In addition, there are local toxicology consultation services in several hospitals in the country. During the period of the study, the population in Israel comprised about 5 million, with about 75% Jews and 25% Arabs.

IPIC = Israel Poison Information Center

To assess the effect of the pre-Passover home cleaning on poison exposures, the weekly numbers of poison exposures reported to the IPIC during 1990–95 were analyzed during the 6 weeks before Passover and the following 6 weeks. These data (n=5,583) included Jewish and Arab children under the age of 15 years. The data were analyzed using two-way analysis of variance, and the means for the 2 week period before Passover and the other weeks were compared using the unpaired *t*-test. In addition, demographic characteristics (age and gender) and the substances involved in poison exposures were prospectively studied in children reported to the IPIC in 1995. This part of the study related to children under 15 years of age reported to the IPIC during the 2 week period before Passover, and the 3 following weeks, i.e., the week of Passover and the subsequent 2 weeks.

To evaluate specific risk factors, all poison exposures in Jewish children under 15 years old were prospectively studied in seven pediatric emergency rooms during the 2 weeks before Passover, and the following 6 weeks (1 April to 27 May 1995). The following centers participated in the study: Hadassah University Hospitals at Mount Scopus and Ein Kerem, Jerusalem; Terem Immediate Medical Care, Jerusalem; Soroka Medical Center, Beer Sheva; Rambam Medical Center, Haifa; Sapir Medical Center, Kfar Saba; and the Schneider Children's Medical Center of Israel, Petah Tiqva.

Demographic data of the children and their families were recorded. Children were grouped with regard to their family's affiliation with the Jewish religion — secular, religious or ultra-orthodox. The time, location, route and type of poison exposure were recorded. Parents were asked whether the toxic substance involved was kept in an open or closed container at the time of the exposure.

The effects of the risk factors on mean weekly exposure rate were assessed using the Poisson regression.

Results

The IPIC data [Figure 1] indicate, for each year, an increase in the frequency of poison exposures during the 2 weeks before Passover, compared with the remaining 10 weeks. The data were analyzed using two-way analysis of variance, and lack of interaction was checked both graphically and by Tukey's one degree of freedom test. The difference between the average number of exposures during the 2 weeks preceding Passover and the remaining 10 weeks (100.75 and 72.93) was highly significant (t=7.04, P=0).

Analysis of the demographic characteristics of children reported to the IPIC in 1995 before and after Passover shows an increase of 65% in the frequency of all poison exposure in children during the 2 weeks before Passover compared with the following 3 weeks. The frequency of ingestion of cleaning substances was 52% of all poison exposure in the 2 weeks before Passover compared with 18% of all poison exposures in the following 3 weeks, an increase of 291%. As expected, the vast majority of pediatric exposures to these substances occurred in children

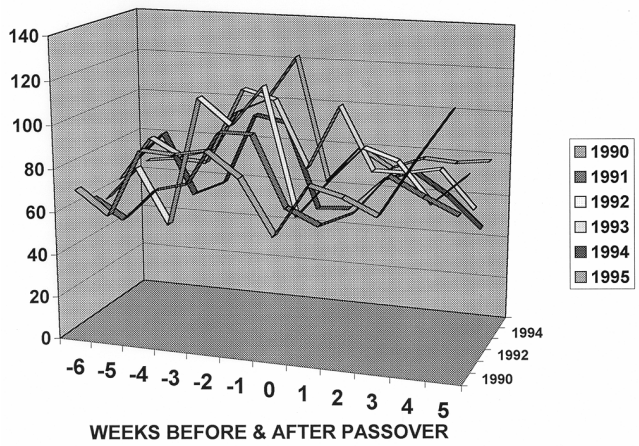

Figure 1. Weekly fluctuations of poison exposures in 5,583 children under age 15, reported to the Israel National Poison Information Center, during periods of 6 weeks before and 6 weeks after Passover over 6 years (1990–95).

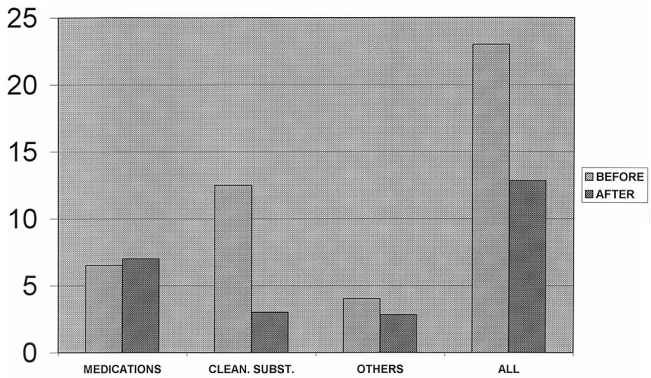

Figure 2. Mean number of poison exposures per week, by substance category, in 123 children under age 15 treated in seven pediatric emergency services in Israel during the 2 weeks before Passover and the following 6 weeks in 1995.

under the age of 6 (90% and 91%, in the pre-Passover and post-Passover periods, respectively). There was a higher rate of exposures in males (61% of all poison exposures and 59% of exposures to cleaning substances).

In the study conducted at the seven pediatric emergency rooms, there were 123 consecutively selected Jewish children under age 15 (56% males), and 80% were younger than 6 years of age.

Data on the relative frequencies of cases before and after Passover, broken down by the type of substance, are shown in Figure 2. The data indicate a twofold increase (from 12.8 to 23) in weekly frequencies of poison exposures, for the 2 weeks preceding Passover compared with the following 6 weeks. Figure 2 also indicates that the increase is largely due to exposures to cleaning substances. The weekly exposure rates before and after Passover were compared using the Poisson regression. The overall twofold increase was highly significant (P=0.01). There were no significant pre- and post-Passover rate differences of medications and other substances, but for cleaning substances the pre-Passover rate

was 4.2 times the post-Passover rate ($P<0.001$). The pre- and post-Passover rates for all poison exposures among secular, religious and ultra-orthodox groups were 1.5, 2.3, and 1.95, respectively.

The pre- and post-Passover rates for exposures to cleaning substances among secular, religious and ultra-orthodox groups were 2.66, 8, and 4.5, respectively. These differences were not statistically significant.

In 70% of these exposures, the substance was found in open containers at the time of the event. In some cases, cleaners and detergents were kept in unlabeled bottles, drinking glasses and dishes.

Discussion

Our study shows a marked increase in the frequency of poison exposures in children in Israel during the 2 weeks before Passover. This fact is well documented in the data of the IPIC, where the same pattern was observed each year for 6 consecutive years. Preparations for Passover in traditional Jewish families involve extensive cleaning of homes. During this process, various cleaning substances are used, including soaps, detergents, bleach, scale remover, and oven cleaners. Although the pre-Passover cleaning is usually more rigorous in religious and ultra-orthodox families, our data suggest that significantly higher exposure rates to these substances occur in all the segments of the Jewish population, including non-religious families. Since the pre-Passover cleaning coincides with vacation in public schools and the preschool education system, young children are often at home during this cleaning, thus, the hazard of poisoning is greater.

The increased risk for poison exposures is predominantly due to cleaning substances. Exposure to these substances accounted for 11.2% of all poison exposures in children under the age of 6 in the U.S. [1], and 9.6% in a multicenter study in England [3]. In our study, about half of all poison exposures in children during the 2 weeks before Passover, and 18% of poison exposures in the following 3 weeks, involved cleaning substances.

Despite these high rates of exposures to cleaning substances, the severity of unintentional poisoning caused by such products in Israel has declined over the last decade due to the improvement in product safety. In most cases, bleaches assigned for house cleaning are composed of sodium hypochlorite at a 3–4% concentration. Ingestion of a small amount of such a product results in most cases in minor and transient effects [4]. However, the extensive cleaning of homes, including kitchens and bathrooms, often involves the use of caustic soda, strong acids and drain cleaners. Ingestion of these substances results in much greater toxicity in children [5].

Our finding — that in 70% of exposures to cleaning substances the substance was found in open containers at the time of the accident — is in accordance with a recent study on children in Spain, where the caustic product was not in the original container in 75% of cases [5]. These findings bear an important message for public education.

We also found that exposure to cleaning substances was more frequent in males, with a male to female ratio of 1:44, but this ratio was not different from the male to female ratio of 1:6 for all poison exposures. Other studies have reported that unintentional poisoning in young children was more prevalent in males [1,6]. In the USA, the Toxic Surveillance System data show a pattern of male predominance in poison exposure in children under age 12, and a female predominance in adolescents and adults [1].

In conclusion, we found a marked and consistent increase in exposure to cleaning substances in young children in Israel during the 2 weeks before Passover. This pattern occurred in secular, religious and ultra-orthodox Jewish families, and is explained by the extensive use of cleaners and detergents for cleaning homes in the preparation for Passover. In most cases the cleaners were not kept in the original container at the time of the accident.

Based on our findings, we call for increasing public awareness, tighter observation of children, and keeping cleaning substances in closed containers to ensure the safety of children during the process of extensive home cleaning before Passover.

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References

1. Litovitz TL, Klein-Schwartz W, Dyer KS, Shannon M, Lee S, Powers M. Annual Report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. *Am J Emerg Med* 1998:16:443–97.
2. Baker MD. Holiday hazards. *Pediatr Emerg Care* 1985:1:210–14.
3. Ferguson JA, Sellar C, Goldacre MJ. Some epidemiological observations on medicinal and non-medicinal poisoning in preschool children. *J Epidemiol Community Health* 1992;46:207–10.
4. Racioppi F, Daskaleros PA, Besbelli N, Borges A, Deraemaeker C, Magalini SI, Martinez Arrieta R, Pulce C, Ruggerone ML, Vlachos P. Household bleaches based on sodium hypochlorite: review of acute toxicology and poison control center experience. *Food Chem Toxicol* 1994:32:845–61.
5. Casasnovas BA, Martinez EE, Cives VR, Villanueva JA, Sierra R, Cadranel S. A retrospective analysis of ingestion of caustic substances by children. Ten-year statistics in Galicia. *Eur J Paediatr* 1997:156:410–14.
6. Hoy JL, Day LM, Tibballs J, Ozanne-Smith J. Unintentional poisoning hospitalisations among young children in Victoria. *Inj Prev* 1999:5:31–5.

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