Accidental poisoning in young children

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SUMMARY Cases of accidental childhood poisoning admitted to hospital were compared with community controls and hospital controls matched for age and sex. The relative risks of factors in the cases compared with both the control groups were significant for roughness, aggressiveness, noisiness, and pica behaviour in the child, and for large families. Mothers' knowledge of the toxicity of common household products and drugs did not give significant risk differences between cases and controls. The majority of poisonings occurred during the summer months.

Mortality in England and Wales from accidental poisoning (ICD E850–929) in children aged 0–4 fell only marginally from 4.5 deaths per million in 1968 to 4.0 deaths per million in 1977. Morbidity, estimated by hospital discharges in this age group for the adverse effects of chemical substances (medicinal and non-medicinal) showed, with minor fluctuations, a rise from 48.7 discharges per 10 000 in 1968 to 67.1 per 10 000 in 1976. However, between 1975 and 1976 the discharge rates for medicinal poisonings declined whereas those for non-medicinal poisonings increased. It remains to be seen how these trends develop. McLean has suggested that, since the length of hospital stay for accidental poisoning in children has fallen, admissions in recent years have been of a more precautionary nature.

Since 1 January 1976, all aspirin and paracetamol for children has had to be dispensed in child-resistant containers or enclosed in dark tinted or opaque unit packaging. Since 1976 most pharmacists have also voluntarily put all dispersed preparations containing aspirin and paracetamol in reclosable child-resistant containers. More recently, dispensed medicines and counter sales of medicines have had to be labelled 'Keep out of the reach of children' or with words of similar meaning. Since March 1981, the voluntary scheme has been extended so that all solid-dose oral preparations are now dispensed in child-resistant containers.

Previous studies, carried out at different times and in different places, have investigated four main categories of potential aetiological factors. Siibert, in Cardiff, suggested that there was more stress in families of children accidentally poisoned than in controls. Other studies have shown that the personality and behavioural characteristics of children are important factors in accidental poisoning. In the USA it has also been shown that accidental poisoning is not associated with increased availability and accessibility of potentially poisonous substances in the home. Furthermore, the American experience is that there is no difference between poisoned cases and controls in their mothers' knowledge of the toxicity of medicines and common household products. The purpose of the present study was to examine these risk factors as comprehensively as possible in the same population.

Method

The cases studied were children aged 0–4 admitted with accidental poisoning to Dryburn Hospital, Durham, and Bishop Auckland General Hospital between July 1978 and September 1979. Accidental poisoning was defined as the accidental ingestion of potentially toxic medicines or household and other products, though the swallowing of indigestible solid items and exposure to noxious gases were excluded. Two controls, matched for age and sex, were selected for each case. A community control was chosen from the health visitor's list of children under 5 from the
same general practice as the case. A hospital control was
chosen from the next appropriate child admitted
as an emergency after the accidental poisoning. No
children with a history of accidental poisoning were
chosen as controls.

The parents of each case and of relevant controls
were interviewed at home, usually within one week of
the poisoning for cases and within two weeks for
controls. The interview included recording a
narrative of the poisoning incident in cases. Both
cases and controls were given a structured
questionnaire at interview, and the questionnaire
included inquiries about basic demographic and
social data. The child was rated for motor
development using the Denver Developmental
Screening Test and each child’s personality was rated
by the mother for 19 items using a seven-point
semantic differential for every item.6 Parents were
specifically asked about the presence of the following
symptoms or behavioural characteristics: nightmares
or night terrors, nocturnal enuresis, stammering,
thump-sucking, dummy-sucking, nail-biting, recent
abnormal eating habits, and recent onset of
behavioural problems. In addition, the interview
concentrated on certain family stress factors. These
were: serious illness or bereavement within the
family or among close relations; mother pregnant;
single-parent household, or one parent away from
home; recently moved house; anxiety or depression
in parents; a working mother; and another child
under one year old in the home. All mothers were
given a toxicology inventory in which they were
required to state whether 10 different products in
specified amounts were poisonous or non-poisonous
for a child aged 3. The products listed were hair
shampoo, cigarettes, aspirins, contraceptive pills,
turpentine substitute, laburnum seeds, gripe water,
Benylin, Domestos, and Diazepam tablets. The
mothers were separated into three groups according
to their degree of caution compared with the views of
three consultant paediatricians who agreed that six of
the 10 products in the toxicology inventory should be
considered as poisonous. Finally, inquiries were
made about where prescribed and over-the-counter
drugs and potentially poisonous household products
were kept in the house. The houses were inspected
and the drugs and household products were defined
as accessible or inaccessible to a child aged 30 months
according to defined, standardised criteria. All
observations and interviews were carried out by one
author (DSB). For individual characteristics the
relative risk between cases and both control groups
was calculated using McNemar’s test.12

Results

One hundred and twelve children aged 0–4 were
admitted to the two hospitals with suspected
accidental poisoning during the study period.
Seventy-one (63.4%) were boys, 100 (89.3%) were
aged 12–47 months, 10 (8.9%) were poisoned by
drugs dispensed in childproof containers, 51 (45.5%)
by other drugs, and 51 (45.5%) by household and
other products. The rate of admission during the
summer months (July-September), adjusted for the
number of days at risk, was almost double that in
other periods.

One hundred and six of the poisoned children were
admitted to the case-control study; the remaining six
were refusals. All 106 cases were matched with
community controls and 103 cases with suitable
hospital controls. The parents of five initially selected
community controls and nine hospital controls
refused to take part in the study and each was
replaced by the next appropriate control. In both
cases and controls, the acceptors and refusers did not
differ significantly with respect to sex, social class, or
family size.

Table 1 shows a comparison of the mother’s
assessment of the child’s personality characteristics
on a seven-point bi-polar scale between cases and
both control groups. The cases were assessed as being
at significantly greater risk than both control groups
in terms of being rougher, noisier, more aggressive,
and having a greater tendency to pica.

<table>
<thead>
<tr>
<th>Personality characteristic</th>
<th>Cases</th>
<th>Community controls</th>
<th>Hospital controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Delicate — Tough</td>
<td>5.34</td>
<td>5.02</td>
<td>5.76**</td>
</tr>
<tr>
<td>(2) Choosy — Eating well</td>
<td>5.03</td>
<td>4.87</td>
<td>5.97</td>
</tr>
<tr>
<td>(3) Gentle — Rough</td>
<td>5.39</td>
<td>5.00***</td>
<td>4.66**</td>
</tr>
<tr>
<td>(4) Timid — Confident</td>
<td>5.06</td>
<td>4.99</td>
<td>4.84</td>
</tr>
<tr>
<td>(5) Anxious — Relaxed</td>
<td>5.17</td>
<td>5.26</td>
<td>4.56**</td>
</tr>
<tr>
<td>(6) Quiet — Noisy</td>
<td>5.93</td>
<td>5.35**</td>
<td>5.38**</td>
</tr>
<tr>
<td>(7) Unhappy — Happy</td>
<td>6.48</td>
<td>6.49</td>
<td>6.43</td>
</tr>
<tr>
<td>(8) Insecure — Secure</td>
<td>5.65</td>
<td>6.15***</td>
<td>5.27</td>
</tr>
<tr>
<td>(9) Dependent — Independent</td>
<td>5.29</td>
<td>5.40</td>
<td>4.71**</td>
</tr>
<tr>
<td>(10) Bad — Good</td>
<td>4.93</td>
<td>5.10</td>
<td>5.56**</td>
</tr>
<tr>
<td>(11) Excitable — Calm</td>
<td>3.70</td>
<td>4.10</td>
<td>4.09</td>
</tr>
<tr>
<td>(12) Weak — Strong</td>
<td>5.72</td>
<td>5.65</td>
<td>4.73**</td>
</tr>
<tr>
<td>(13) Submissive — Aggressive</td>
<td>4.79</td>
<td>4.38*</td>
<td>4.39</td>
</tr>
<tr>
<td>(14) Passive — Active</td>
<td>5.15</td>
<td>6.25</td>
<td>5.68**</td>
</tr>
<tr>
<td>(15) Isolated — Sociable</td>
<td>5.85</td>
<td>5.83</td>
<td>5.32**</td>
</tr>
<tr>
<td>(16) Selfish — Generous</td>
<td>4.84</td>
<td>5.03</td>
<td>4.66</td>
</tr>
<tr>
<td>(17) Puts things other than food in the mouth— Does not</td>
<td>3.76</td>
<td>5.08***</td>
<td>5.67**</td>
</tr>
<tr>
<td>(18) Not adventurous — Adventurous</td>
<td>5.87</td>
<td>5.89</td>
<td>5.33**</td>
</tr>
<tr>
<td>(19) Soft — Hard</td>
<td>4.57</td>
<td>4.54</td>
<td>3.98**</td>
</tr>
</tbody>
</table>

* p < 0.05
** p < 0.01
*** p < 0.001

Paired t-test
Accidental poisoning in young children

Table 2 shows the relative risk between cases and controls for social, environmental, and developmental factors. The relative risks are high and significant compared with both control groups only for large families, that is, those with four or more children. There was no increased risk associated with social class, unemployment, or inadequate accommodation (rated on defined criteria of bedroom availability for family size and pattern).

<table>
<thead>
<tr>
<th>Table 2 Social, environmental, and developmental factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk factor</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Guardian other than natural father</td>
</tr>
<tr>
<td>Four or more children in family</td>
</tr>
<tr>
<td>Regular care by other adults</td>
</tr>
<tr>
<td>Poor standard of child care (Health visitor rating)</td>
</tr>
<tr>
<td>On observation register</td>
</tr>
<tr>
<td>Below normal development (Denver)</td>
</tr>
<tr>
<td>Manual occupation</td>
</tr>
<tr>
<td>Unemployed head of household</td>
</tr>
<tr>
<td>Inadequate accommodation</td>
</tr>
<tr>
<td>Presence of locked medicine cabinet</td>
</tr>
</tbody>
</table>

* p < 0.05  ** p < 0.01  *** p < 0.001 McNemar’s test

Specific inquiry about emotional problems or behavioural problems did not give significant relative risks compared with either of the control groups. Family stress factors did not give significant relative risks compared with either control group except for single-parent families in community controls alone (p < 0.05) (Table 3). Similarly, there was no significant difference in the proportion of cases or controls with any one or more of these family risk factors.

There was no significant difference between cases and controls in the mothers’ accuracy in defining 10 stated items as poisonous or not. Further analysis also showed that cases did not differ significantly from controls in the readiness with which they defined items as poisonous. In addition, inspection of the homes showed no significant difference in the risks between cases and controls for the presence of a locked medicine cabinet.

Discussion

In the mother’s assessment of her child’s personality and behaviour, our findings agree with Sibert and Newcombe with respect to putting things other than food in the mouth, although the cluster of traits represented by noisiness, aggressiveness, and roughness are also significantly associated with the cases. Being a child in a family of four or more children was a factor significantly associated with the cases, whereas other social and environmental factors did not give significant differences between cases and either of the control groups. This study failed to support the views of Sibert in that family stress was not found to be an important factor, although the two studies were carried out in different areas. Family stress requires further investigation.

There is support from this study for the findings in the USA that parental knowledge of the potential toxicity of medicines and household products is not important, nor indeed is the apparent degree of parental caution in assessing the need for medical care. Although American experience suggests that availability and accessibility of potentially poisonous substances in the home is not associated with accidental poisoning, the relative availability and accessibility of drugs and household products could not be evaluated with accuracy in this study because the offending agent had been removed from the homes of the cases at the time of interview.

The preponderance of cases during the summer months, the high relative risks of large families, and the rougher, more aggressive child personalities and pica suggest that it is supervision which is most important in childhood poisoning, although it should be emphasised that this study is concerned with suspected poisoning rather than true poisoning per se. Case-control studies give relative risks, and further longitudinal studies would be required to determine the attributable risk, although it may be prudent for health visitors to advise families with the above risk characteristics about the need for more careful supervision during the summer months.

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References


