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What is This?
Risk Factors for Otolaryngological Foreign Bodies in Eastern Poland

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Abstract

Objective. To identify the sociodemographic characteristics and risk factors associated with suspected foreign bodies in the ear, nose, throat, airway, and esophagus among Polish children.

Study Design. Case series with chart review.

Setting. Tertiary care medical center.

Subjects and Methods. A retrospective analysis of the medical records of patients hospitalized for a suspected foreign body (FB) between 1998 and 2008 was conducted. Data regarding place of residence, presence of siblings, parents’ educational status, seasonality, psychomotor development, age, and sex were collected and statistically analyzed.

Results. Of the 1011 patients with suspected foreign body insertion, 849 (84%) had a positive diagnosis. Of the confirmed foreign bodies, 96 were found in the tracheobronchial tree, 142 were found in the esophagus, and 611 were located in the external auditory canals, nasopharyngeal passage, tonsils, auricles, or lips. Sociodemographically, 596 of the children came from urban areas, with a preponderance of males (55%). Objects were removed more frequently in summer and autumn (60%). Children with siblings (53%) predominated. The majority of patients (52%) had parents with an elementary education. Food was the most frequent foreign body in children under 3 years of age. Patients with delayed psychomotor development constituted 1.6% of the analyzed population.

Conclusions. Being male, 1 to 3 years of age, belonging to an urban family with siblings, and having parents with an elementary education increased the risk of foreign body insertion. Training caregivers about proper nutrition and safety rules when playing with children can reduce the risk of accidents related to foreign body insertion.

Keywords
aerodigestive tract, children, ear, nose, and throat, education, foreign body, rural, urban

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Ear, nose, and throat (ENT) foreign bodies (FBs), as well as tracheobronchial and esophageal FBs, are a serious medical problem for children all over the world. Even though this issue has been widely discussed in medical and parental literature, hospitals continue to admit new patients with FBs. Most statistical data concerning FBs come from the United States. According to this information, FBs cause 2000 to 3000 deaths per year.¹⁻⁴ The types of FBs found in the ENT or tracheobronchial and esophageal tracts and the causes of accidents related to FBs vary with age.⁵ Infants choke mostly because of inappropriate food content, preparation, or delivery; they rarely put objects into their nose or ears. Toddlers tend to experience their environment organoleptically, placing different objects in the natural orifices of their bodies because they are bored, curious, or mimicking their peers. Children in this age group are more likely to be active while eating. Poor coordination during swallowing and inadequate glottic closure are frequent causes of choking.⁶

After entrance into the nasal canal or oropharynx, the FB may indirectly affect the tracheobronchial tree and esophagus. Some FBs are lodged in the upper part of the aerodigestive tract, whereas others go further.

There are few publications on the sociodemographic risk factors in European populations for FB issues. The aims of this study were to determine the factors influencing FB-induced injuries and to find ways to prevent them. This study was performed in Eastern Poland, which is predominantly an agricultural region inhabited by a native white Polish population.
Methods

This study was approved by the Ethics Committee of the Medical University of Lublin (KE-0254/194/2009). Data were collected in accordance with the International Statistical Classification of Diseases and Related Health Problems (ICD-10) from the medical records of patients treated at Children’s University Hospital of Lublin (a tertiary referral center in southeastern Poland). We analyzed the files of 1011 white children with a history of accidents related to FB insertion who were treated at the Department of Pediatric Otolaryngology, Phoniatrics, and Audiology within an 11-year period. The diagnostic procedures necessary for detecting FBs included: plain chest or skull X-ray, bronchoscopy, esophagoscopy, otoscopy, and anterior rhinoscopy.

The population was divided into 3 age groups: infants (1-12 months), toddlers (1-3 years of age), and children older than 3 years. Each year was divided into quarters: winter (January-March), spring (April-June), summer (July-September), and autumn (October-December). Communities were classified as rural when the population density was below 100 inhabitants per km².

The results were statistically analyzed using simple proportion and Pearson’s chi-square test. Statistical significance was set at \( P < 0.05 \). Multivariable tables were drawn. Statistica 7.0 PL (StatSoft Inc, Tulsa, Oklahoma) was used for all statistical calculations.

Results

Of the 1011 patients suspected of FB ingestion or aspiration, 849 (84%) had a positive diagnosis. Among these confirmed patients, 96 (9%) objects were found in the esophagus, 142 (14%) were found in the tracheobronchial tree, and 611 (60%) were located in the external auditory canals, nasopharyngeal passage, tonsils, auricles, or lips. The FBs included food, insects, toys, buttons, pieces of crayon, clay, beads and small button-shaped batteries, coins, pieces of jewelry, and tools (Table 1). The mean age of the patients was 4.6 years (range, 5 months-16 years). The age and sex distribution revealed that male patients between 1 and 3 years of age were predominant (Figure 1). Most patients (596; 59%) came from urban areas. Children from large families were more frequently hospitalized with suspected FBs in comparison to their peers with no siblings (Figure 2).

An analysis of the parents’ education status showed that the vast majority of caregivers had an elementary education (Figure 3). Most patients were admitted to the hospital during summer and autumn (Figure 4).

There was no significant correlation (\( P = .53501 \)) between the patients’ place of residence and season of the year in which FB insertion occurred (Table 2). However, 60% of all hospitalizations occurred in the summer and autumn.

We found a highly significant correlation between the type of FB and patient age (\( P = .00065 \)). Food FBs were most frequently removed from infants and toddlers, especially nuts of different kinds. Fish bones, which are considered obvious FBs, were found in only 26 cases. Coins were the second most frequently found FB in toddlers and children older than 3 years of age (Table 3). Among all studied children, we noted 16 mentally challenged patients (1.6%) who inserted FBs themselves (8 esophageal, 5 nasal, and 3 aural).

Discussion

FB-related injuries are frequent emergencies in childhood and are the subject of many scientific publications. However,
most reports concerning the sociodemographic factors associated with FB insertion are from Asian and African countries, whereas few FB-related sociodemographic studies have been performed in Europe. Our findings show that toddlers are at the greatest risk of FB injury, in agreement with the literature.8 Swedish researchers,9 however, noted a peak in FB intrusion at 10 to 12 months of age, and Ngo et al10 reported that children between the ages of 4 and 8 constituted the largest population with a FB injury. In our study, male predominance was noted, with a sex ratio of 1.23 males to 1 female, which is comparable with other studies.11-14 Afolabi et al15 reported an even higher male preponderance of 2:1. One explanation for this seems to be obvious since boys are usually more active than girls, who are more fearful.

In agreement with other research,14 our survey found that nasal FBs predominated, followed by FBs in the ear. Because the nose is an easily accessible natural orifice, children have ready access for exercising curiosity and hiding tiny things. Toys that can be disassembled present a danger of small parts, and one of the main nasal findings in this study was the insertion of flat batteries.

An analysis of the patients’ place of residence revealed that the majority were from urban areas, a finding similar to that reported in the literature.14 Surprisingly, Hjern et al9 observed equal participation of urban and rural patients in their analysis of 2895 Swedish toddlers with a history of FBs born between 1987 and 1991. Similar to their data, most of the Polish children in our study had siblings, especially those older than 3 years. This might be explained by the fact that parents are often self-excused by asking older children to take care of a younger sibling. Incompetent care can end miserably with a FB lodged in a child’s natural orifice.

In the present study, caregivers with only an elementary education were prevalent among children with a FB injury. Highly educated parents constituted the smallest group, in accordance with other studies.9,14 The parents’ education level plays an important role in the prevention of FB

### Table 2. Correlation between the Place of Residence and Season in which Insertion Occurred

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Urban</th>
<th>Rural</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>132 (59)</td>
<td>91 (41)</td>
<td>223</td>
</tr>
<tr>
<td>Spring</td>
<td>103 (55)</td>
<td>79 (45)</td>
<td>182</td>
</tr>
<tr>
<td>Summer</td>
<td>171 (56)</td>
<td>132 (44)</td>
<td>303</td>
</tr>
<tr>
<td>Autumn</td>
<td>159 (52)</td>
<td>144 (48)</td>
<td>303</td>
</tr>
</tbody>
</table>

χ² = 2.18; P = .53501
aspiration among children. An awareness of the potential risk factors associated with the type of food and the availability of small objects that could become FBs is an important element in protecting young children from FB injury.

A review of the literature suggests that the nature of the FB depends on social, economic, and cultural factors. In our study, food (crushed peanuts, hazelnuts, and walnuts) was the most common FB regardless of the location in the body (except in the esophagus where coins predominated). The nuts usually came from chocolate or were allowed by elders to be eaten separately. In Central and Eastern Europe, children are allowed to eat many sweets, and their diet is poor in fish and vegetables. In contrast, the FBs found in Asian or African countries are predominantly fish bones and seafood shells, whereas coins constitute only 3% of all FBs. In Western countries, coins are the most popular esophageal FBs because of their accessibility to children. Beans, which have been reported as frequent FBs in other studies, were seldom noted in our survey. Similarly, colored beads or common cultural dressing accessories, which are often found as FBs in African countries, were rarely observed in our study.

Nichols et al evaluated parental knowledge regarding children’s food and non-food choking hazards. They concluded that the awareness of caregivers of the risk of FBs is incomplete and needs further improvement. In Poland, such surveys have not been performed.

A seasonal correlation was found both in our study and in the literature. A peak was noted in the summer and autumn months, which is probably associated with vacations and poor adult supervision, especially in rural areas.

In agreement with other studies, those children in our study with an impaired swallowing reflex, delayed psychomotor development, or a medical history of congenital esophageal pathology, were more likely to suffer from FB insertions. Such children often become ENT patients multiple times because of the obstruction of natural tubes and orifices, which can trap food or small objects. Another favoring factor is that children with delayed psychomotor development like to play games with their natural orifices.

Conclusions

Male patients, aged 1 to 3 years, from urban families, with siblings, and having caregivers with an elementary education are at increased risk of FB insertion. Many adverse events connected with FBs might be avoided, especially those concerning children younger than 3 years. While performing their duties in connection with daily supervision, an important task for caregivers is to prevent children from putting potentially dangerous objects into their natural orifices and providing an age-appropriate diet.

Poland has recently launched an educational campaign to raise the awareness of parents and caregivers about the hazards of children swallowing FBs and corrosive substances. Although it does not cover all hazards associated with FB insertions, this campaign may help to decrease (total prevention is impossible) the number of children admitted to the hospital with an FB-related injury.

Author Contributions

Beata Rybojad, collected data, designed study, wrote article, approved final version; Artur Niedzielski, collected data, analyzed data, approved final version; Grażyna Niedzielska, revised article, approved final version; Paweł Rybojad, revised article, statistically analyzed, approved final version.

Disclosures

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References


