

Original article

Parental Awareness Regarding Button Battery Hazards Based on An Online Questionnaire

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Abstract

Button battery ingestion is a growing pediatric hazard with rapid, severe complications. This study assessed parental awareness of button battery risks among caregivers of young children in Benghazi, Libya, using a cross-sectional online questionnaire (21 items) distributed via WhatsApp groups of 13 kindergartens from October to December 2025. Data from 431 complete responses from parents and caregivers of children aged 0–6 years were analyzed using the Relative Importance Index (RII; high: 0.80–1.00; moderate: 0.65–0.79; low: <0.65). Respondents were mostly female (83.1%), aged 31–40 years (49.0%), and university-educated (71.5%). While there was high awareness of life-threatening risks (96.1%, RII=0.98) and general danger (86.9%, RII=0.93), gaps were identified regarding the speed of injury (14.4%, RII=0.57) and symptom recognition (29.0%, RII=0.64). Good practices included supervision (74.5%, RII=0.87) and emergency action (72.4%, RII=0.86), but awareness of using honey as an immediate intervention was poor (33.6%, RII=0.42). The internet served as the primary information source (57.1%), and 87.2% of participants desired more information. Good awareness significantly varied by education level ($P=0.003$). In conclusion, while parents recognize button battery lethality, critical gaps exist in symptom recognition, injury rapidity, and first-aid measures like honey administration, highlighting the essential need for targeted campaigns via healthcare and schools to bridge these gaps and prevent complications.

Keywords. Button Battery, Parental Awareness, Hazard.

Introduction

Button battery ingestion in children is a significant and growing health concern worldwide due to the increasing presence of these batteries in household electronics.[1] The ingestion mainly affects young children, especially those under 6 years old, with a peak incidence around 1 year of age.[2] Recent research highlights a drastic rise in the incidence and severity of complications associated with button battery ingestion over the last two decades, attributed largely to the widespread use of larger (around 20 mm), high-voltage lithium button batteries in consumer products [3].

The injury mechanisms from button battery ingestion include direct pressure necrosis on the mucosa, leakage of alkaline battery contents causing chemical burns, and electrical current generated at the battery-mucosa interface, which rapidly creates a highly alkaline environment leading to severe tissue necrosis.[4] Esophageal impaction is particularly dangerous and can cause full-thickness burns, perforations, and even fatal complications like aorto-esophageal fistulas within hours after ingestion.[5] The severity of injury escalates quickly, often within 2 hours, and harmful effects may continue even after battery removal.[6]

Recent epidemiological data and studies show the relative risk of severe morbidity has increased approximately seven-fold in two decades.[7] About 7–25% of pediatric foreign body ingestions are button batteries, with lithium cells being the most hazardous.[8] Most ingestions occur at home, often involving batteries from toys, remote controls, or hearing aids.[9] Complications are more common in younger children and in cases where ingestion is unwitnessed, which delays diagnosis and intervention.[10]

Unwitnessed ingestions and a lack of parents' suspicion are associated with delays in diagnosis and intervention, making parental awareness and education about the dangers of button battery ingestion crucial in preventing these potentially life-threatening events. Many parents and caregivers have limited knowledge about the severity and rapid progression of injuries caused by button batteries, often underestimating the risks associated with household items containing these batteries [11]. Lack of awareness contributes to delays in seeking medical attention and increases the likelihood of severe complications [12]. Educational campaigns targeting parents, highlighting safe storage, supervision, and immediate action protocols upon suspected ingestion, have been shown to improve awareness and reduce incidence rates [13]. Healthcare providers also emphasize the importance of counseling families during routine pediatric visits to reinforce battery safety measures at home [11–13]. The aim of this study was to increase our knowledge of parent and caregiver awareness of button battery hazards at home and to contribute to the currently limited knowledge on this topic.

Methods

A cross-sectional study was conducted to assess parental awareness of button battery hazards using an anonymous online questionnaire. Participants were parents and caregivers of young children recruited through social media platforms (An Online questionnaire disseminated through kindergarten WhatsApp groups, including 13 kindergartens in Benghazi). Inclusion criteria targeted individuals responsible for children in early childhood.

The survey consisted of approximately 21 questions, including demographic items and questions mainly formatted as 'Yes,' or 'No' responses, along with multiple-choice questions. This assessed knowledge related to button battery dangers, symptoms of ingestion, safe disposal practices, and attitudes toward supervision and product safety.

Prior to distribution, the questionnaire was piloted and refined to ensure clarity and appropriateness of items. Data collection took place over a period from October to December 2025. A total of 431 parents and caregivers completed the full survey, and their data were analyzed. A value of Relative Importance Index (RII) ranging from 0.8-1.0 indicates high importance, values ranging from 0.65-0.80 indicate moderate importance, and values below 0.65 indicate low importance.

Results

The study included 431 parents of children aged 0–6 years. Approximately half of the respondents were aged 31–40 years (49.0%). The majority of respondents were female (83.1%), and most had a university degree or higher education (71.5%). Parents with three or more children constituted the largest proportion of the sample, as shown in Table 1.

Table 1: Demographic Characteristics of the parents

Characteristics	N (%)
Age	
Less than 20 years	45 (10.4%)
20-30	92 (21.3%)
31-40	211 (49.0%)
41-50	75 (17.4%)
More than 50	8 (1.9%)
Gender	
Female	358 (83.1%)
Male	73 (16.9%)
Education level	
Less than middle school	25 (5.8%)
Middle school certificate	21 (4.9%)
High school certificate	77 (17.9%)
University degree/Higher education	308 (71.5%)
Number of children	
1 child	15 (3.5%)
2	75 (17.4%)
3	123 (28.5%)
4	113 (26.2%)
More than 4	105 (24.4%)

Table 2 presents the level of parental awareness and knowledge regarding the hazards of button battery ingestion. The majority of parents (96.1%) were aware that swallowing a button battery can be life-threatening for children. Also, 86.9% of them knew that the batteries are generally dangerous, and 68.7% knew which household products contain them. Conversely, parental knowledge was significantly lower regarding specific symptoms a child might show after ingestion (29.0%). The lowest level of knowledge identified was related to how quickly a button battery can cause serious injury after ingestion (14.4%). The results indicate that while general awareness is high for certain aspects, specific knowledge gaps exist.

Table 2. Parents' awareness and knowledge of button battery ingestion hazards

Statements	Good	Poor	Relative Importance Index	Rank
	No (%)	No (%)		
I know which household products contain button batteries	296 (68.7%)	135 (31.3%)	0.84 (high)	3
I am aware that swallowing a button battery can be life-threatening for children	414 (96.1%)	17 (3.9%)	0.98 (high)	1
Button batteries are dangerous for children	374 (86.9%)	57 (13.2%)	0.93 (high)	2
I know the symptoms a child might show after swallowing a button battery	125 (29.0%)	306 (71.0%)	0.64 (low)	4
I know how quickly a button battery can cause serious injury after ingestion	62 (14.4%)	369 (85.6%)	0.57 (low)	5

The attitudes and practices of parents regarding button battery ingestion hazards are presented in Table 3. The practice of supervising children when they play with items containing button batteries was reported by 74.5% of parents, followed by 72.4% for knowledge of the first action to take if a child swallows a battery (going immediately to the emergency

department). The practice of keeping devices out of children's reach was reported by 64.3%, while 61.0% of parents reported checking for secure battery compartments. Only 33.6% of parents were aware that honey may help reduce injury after button battery ingestion.

Table 3. Parents' attitudes and practices toward button battery ingestion hazards

Statements	Good	Poor	Relative Importance Index	Rank
	No (%)	No (%)		
Keeping devices with button batteries out of children's reach	277 (64.3%)	154 (35.7%)	0.82 (high)	3
Checking if toys or devices have secure battery compartments	263 (61.0%)	168 (39.0%)	0.80 (high)	4
Supervising children when they play with items containing button batteries	321 (74.5%)	110 (25.5%)	0.87 (high)	1
Knowledge of first action if child swallows a button battery	312 (72.4%)	119 (27.6%)	0.86 (high)	2
Awareness that honey may help reduce injury after button battery ingestion	43 (33.6%)	286 (66.4%)	0.42 (low)	5

A total of 73 parents (16.9%) reported that they had not received any information about button battery hazards, while the remainder reported receiving information from different sources, as shown in Figure 1. Among these sources, 67 parents (15.5%) received information from television or radio, 246 (57.1%) from the internet, 52 (12.1%) from healthcare providers, and 177 (41.1%) from friends or family. In addition, 87.2% of parents reported that they would like to receive more information about button battery safety. Furthermore, 86.1% had not seen or heard about any public safety campaigns related to button batteries in the past year, and 66.4% had not received warning posters about button battery safety from healthcare settings or schools.

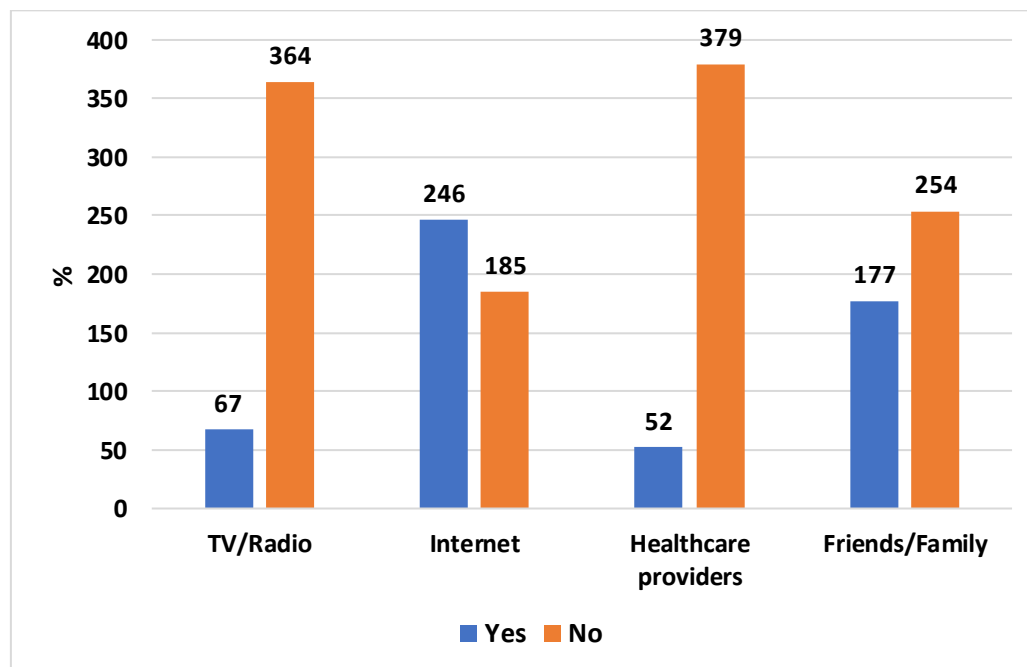


Figure 1: Sources of information about button battery hazards reported by parents

Figure 2 shows that the proportion of parents with overall good awareness and knowledge differed significantly across educational levels ($P = 0.003$), with higher proportions observed among parents with university or higher education. In contrast, overall good attitudes and practices did not vary significantly by educational level ($P = 0.40$).

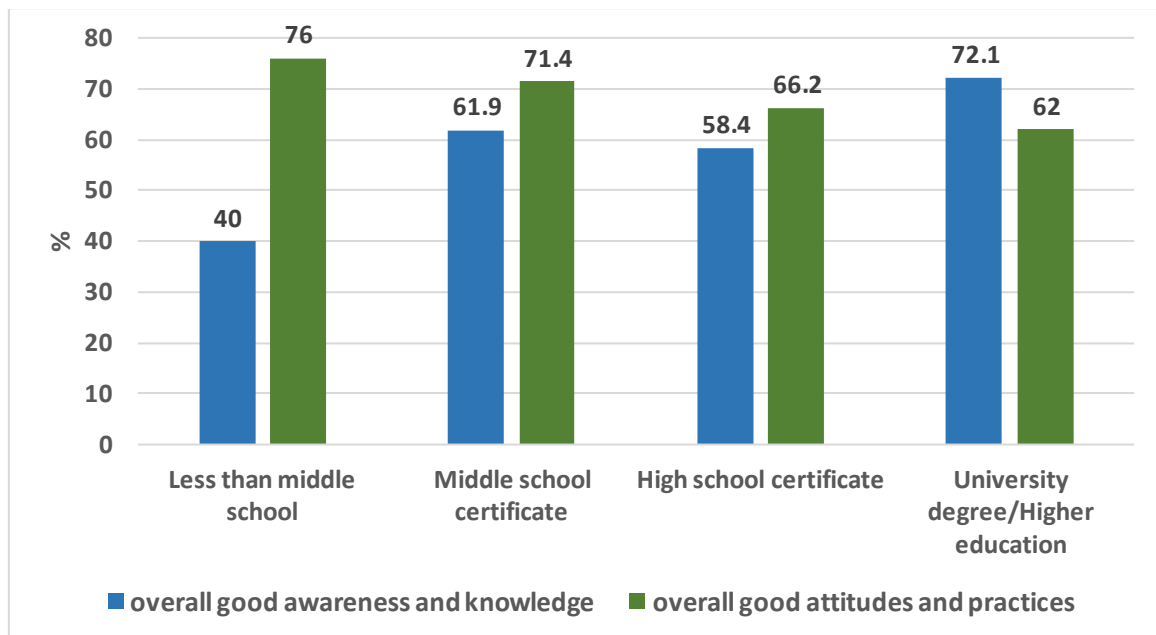


Figure 2. Percentage distribution of overall good awareness and knowledge and overall good attitudes and practices regarding button battery ingestion hazards by parents' educational level.

N.B.: Percentages are calculated separately for awareness and knowledge and for attitudes and practices within each educational level (each summing to 100%).

Discussion

In evaluating the demographic characteristics of our sample (Table 1), it is notable that nearly half of the parents were aged 31–40 years, the majority were female (83.1%), and most had at least a university degree (71.5%). This profile is broadly consistent with recent cross-sectional surveys of parental awareness of button-battery hazards, which similarly report a predominantly female, middle-aged, and relatively well-educated sample recruited via social media or online platforms.[14] Such a sample may overrepresent more health-literate caregivers, which may partially explain the relatively high baseline awareness of the life-threatening nature of button-battery ingestion observed in our study, while limiting generalizability to parents with lower education or limited internet access.

In evaluating parents' awareness and knowledge of button battery ingestion hazards (Table 2), our findings indicate that while general awareness of the severity of button battery ingestion was high, important knowledge gaps remain. Most parents recognized that swallowing a button battery can be life-threatening for children (96.1%) and understood that button batteries are dangerous (86.9%), which is comparable to, or slightly higher than, results from other recent cross-sectional surveys of parents. For example, a recent Australian study found that most parents acknowledged the dangers of button batteries, yet only about two-thirds appreciated the potentially life-threatening nature of ingestion, suggesting that our sample may have somewhat greater awareness of severity.[14]

Similarly, another online parent survey from the USA reported that 80% of respondents recognized the potential for fatality, but a large proportion underestimated the speed and severity of injury, again highlighting that high-level risk perception often coexists with incomplete practical understanding.[15] These comparisons reinforce that, across diverse settings, parents commonly accept that button batteries are hazardous and can be fatal, but this generalized awareness does not reliably translate into detailed knowledge of symptoms, injury progression, or emergency management, which remain critical targets for tailored educational interventions.

However, knowledge related to practical and time-sensitive aspects was considerably lower. Only 68.7% of parents were able to identify household products containing button batteries, and substantial deficits were observed in recognizing clinical manifestations and understanding the rapid progression of injury. Fewer than one-third of parents could identify symptoms following ingestion (29.0%), and only 14.4% were aware of how quickly serious injury can occur. The Relative Importance Index further highlighted these disparities, with awareness of life-threatening potential ranking highest (0.98), whereas knowledge of the injury timeframe ranked lowest (0.57), underscoring critical areas where targeted parental education and preventive interventions are needed.[16]

The findings reveal notable strengths and weaknesses in parents' attitudes and practices regarding button battery safety (Table 3). Encouragingly, approximately three-quarters of parents (74.5%) reported supervising children when they play with items containing button batteries, and a similar proportion (72.4%) knew the appropriate first action if a child swallowed a button battery, representing the highest-ranked safety behaviors. Additionally, nearly two-thirds of parents (64.3%) kept devices with button batteries out of children's reach, and 61.0% checked that toys or devices had secure battery compartments. However, a critical gap emerged regarding honey administration, with only 33.6% of parents aware that honey may help reduce injury after button battery ingestion—the lowest-ranked item, with a Relative Importance Index of

0.42. This finding is particularly concerning given that honey has been suggested as a potentially protective measure that can be administered while seeking emergency care. While parents demonstrated relatively strong preventive practices in terms of supervision and storage, poor awareness of this specific harm-reduction strategy suggests that public health messaging may need to better emphasise both prevention and emergency response measures to comprehensively address button battery ingestion risks.

In addition, the sources of information reported by parents (Figure 1) help to explain the observed gaps in knowledge. Although more than half of parents reported obtaining information from the internet, relatively few received information from healthcare providers, and the majority reported no exposure to public safety campaigns or warning materials in healthcare or educational settings. Reliance on informal or non-specialist sources, such as the internet and friends or family, may contribute to incomplete or inconsistent knowledge, particularly regarding time-sensitive and clinical aspects of button battery ingestion. The limited role of healthcare professionals as information sources may partly account for the poor awareness of symptom recognition, injury progression, and evidence-based emergency responses, such as honey administration. These findings highlight the need for more structured and consistent dissemination of button battery safety information through healthcare settings and public awareness campaigns to ensure that parents receive accurate, actionable guidance. The observed differences across educational levels (Figure 2) suggest that higher educational attainment may be associated with better awareness and knowledge regarding button battery ingestion; however, these findings (from Tables 2 and 3) also indicate that educational interventions are needed for all parents, with particular emphasis on those with lower levels of formal education.

Conclusion

This study shows that parents are generally aware that button battery ingestion is life-threatening and that button batteries are dangerous, but they lack detailed knowledge about specific symptoms, the rapid progression of injury, and evidence-based emergency measures such as honey administration. Preventive practices such as supervision, keeping devices out of reach, and checking secure battery compartments are relatively common, yet awareness of time-sensitive clinical and management aspects remains low. These results highlight the need for precise, targeted educational programs—delivered through healthcare services, schools, and public-safety campaigns—that clearly explain symptoms, injury timelines, and immediate actions to reduce the risk of severe and potentially fatal complications from button battery ingestion in young children.

Conflict of interest

There is no conflict of interest to declare.

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