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Cross-Sectional Study (Original)

Parents Perceived First Aid Skills in Dealing with the Ingested Poisoning Products, Saudi Arabia, a Cross-sectional Study

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Abstract:

Introduction: Toxins are substances that can lead to harmful effects when introduced to the body. Accidental poisonings remain a critical concern for pediatric health, so understanding the nature of toxins and the potential risks associated with them is a fundamental aspect of child safety. Parents' knowledge and attitudes towards toxins and poisoning incidents significantly influence the outcomes of accidental exposures.

Materials and Methods: An observational cross-sectional study conducted across various regions of Saudi Arabia in March 2024. Participants were selected by convenience sampling. A total of 1,997 participants took the self-administered questionnaire.

Results: The majority of the participants are married and Saudis. 36.7% of parents had neutral feelings towards handling a child poisoning incident, while 27.4% knew how to handle these situations. 74.1% of parents knew who to contact in a poisoning incident. When a child swallows a poison, 44% of parents would take them to the Emergency Room immediately, 26% would give milk, and 19.5% would induce vomiting. In case a child inhales a poison, 45.9% of parents would go to the Emergency room, and 40.9% would move the child to an area with fresh air. If a child had a poisonous substance to the eyes or applied to the skin, 43% of parents would wash it with cold water. Unconsciousness (91.2%), vomiting (90.3%), difficulty breathing (88.2%), and abdominal pain (88.2%) were the most common symptoms raising suspicion of a poisoning incident. Only 31.8% of the parents had First Aid skills.

Conclusion: There is notable awareness among parents regarding the need for immediate action in poisoning incidents. However, the lack of parents' knowledge of first aid skills emphasizes the importance of improving parents' knowledge and preparedness in dealing with such incidents. To reduce the lack of first-aid knowledge among parents, promoting campaigns and first-aid training programs are recommended.

Keywords: Children; Poison; Incident; First Aid; Saudi Arabia.

Background

Toxins are substances that, when introduced into the body, can lead to harmful effects, ranging from mild discomfort to severe injury or even death. These harmful effects may be caused by various mechanisms, including chemical, biological, and physical interactions with the body's cells and systems [1]. Understanding the nature of toxins and the potential risks associated with them is a fundamental aspect of child safety. Furthermore, In the United States, children 5 years and younger accounted for a considerable portion of pesticide-related poisoning cases [2]. Furthermore, Bleaching products and synthetic detergents as per Australian parents/guardians when were asked about the common causes of pediatric poisoning, the majority (80%) cited household cleaning chemicals [3]. Toxin exposure in pediatrics can lead to a range of adverse outcomes, depending on factors such as the type and amount of the ingested substance, the child's age, and the route of exposure [4]. The consequences of toxin exposure may include symptoms such as gastrointestinal discomfort, allergic reactions, and loss of consciousness [5] or more severe effects like acute respiratory distress syndrome, multiple-organ failure, and even fatalities [6].

Moreover, parents' knowledge and attitudes towards toxins and poisoning incidents significantly influence the outcomes of accidental exposures. Several studies indicate that parental awareness and preparedness vary widely, with a substantial proportion of caregivers expressing limited confidence in their ability to respond effectively to poisoning emergencies. For instance, a survey by Bánfai et al. found that only 4.3% of preschool students' parents had enough knowledge in dealing with a poisoning incident of their child [7]. Various other studies elucidate the subpar knowledge of caregivers in dealing with a pediatric toxicity incident [8,9]. For example, study conducted by Abel Galil et al reported that around a half of participants had adequate practice of the first-aid measures for skin and eye exposures [10]. Also, another study conducted by Dayasiri et al reported that approximately one-third of the parents of children exposed to accidental poisoning had inadequate or even harmful first-aid practice [11]. This underscores the need to assess and improve parents' first aid capabilities in managing ingestional incidents as accidental poisonings remain a critical concern for pediatric health. Effective first aid skills in dealing with ingested poisoning products can minimize the impact of toxin exposure and save

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lives. The correct application of first aid in case of intoxication, could help limit further damage and injuries to the child's health (12). Therefore, this study aims to assess the parents' perception regarding first aid response to a pediatric poisoning incident and the reflect the importance of educational interventions that empower caregivers with the knowledge and confidence needed to respond effectively in cases of accidental poisoning.

Materials and Methods

Study settings and participants.

A cross-sectional study was conducted in Saudi Arabia, in March 2024, including various regions of Saudi Arabia targeting the public population. This study was designed to assess the parents' perception regarding first aid response to a pediatric poisoning incident using a questionnaire. Participants were selected by convenience sampling. The participants were included in this study if they were parents, Saudis or non-Saudis, living in Saudi Arabia. A total of 1,997 participants who met the inclusion criteria were included. However, the exclusion criteria were single individuals or parents with no children.

Data collection process:

Data were collected using a self-administered questionnaire, which was created and designed after a review of relevant literature. The questionnaire had two main parts. The first part was about the socio-demographics of the participants, such as sex, nationality, marital status, and parents' level of education. The second part focused on questions regarding the parent's perception regarding response to 19 questions related to pediatric poisoning incident and first aid skills. For example, this research aimed to report whether participants knew how to deal with a child poisoning incident or not, who to contact in case of a poisoning incident, and what to do in case a child swallowed, inhaled, or applied a poisonous substance. In addition, the questionnaire included parents' insights on handling unconsciousness post-poison exposure, whether certain symptoms make them more suspicious of the possibility of poisoning in a child or not, and their confidence level in implementing their first aid skills in these situations.

The questionnaire, which was originally written in English and then translated to Arabic, was validated by sending it to experts and nonexperts and modifying it according to their feedback appropriately [13]. Moreover, to ensure the validity

of the questionnaire a pilot study was performed. A pilot study was done by sending the questionnaire to the target population and taking their comments and feedback into consideration. Those who took the pilot study were excluded from the participant responses of the final study. After that, using Google Forms (Alphabet Inc., Mountain View, CA, USA) to create the questionnaire, it was distributed to the general population by assigned data collectors across different regions of Saudi Arabia over a four-week period. Participants were given Ipad or Phone to fill the form to ensure that only one response is submitted per participant and avoid any duplicates may occur by the supervision of data collectors upon filling the form. Informed consent was obtained from all participants before they participated in the study; it clarified the purpose of the study and that the participants were participating voluntarily and had the right to withdraw at any time without consequences.

Data analysis

Simple descriptive statistics are reported as frequency and percentage for qualitative data using SPSS version 18 (IBM Corp., Armonk, NY, USA). Selection and information biases were minimized as much as possible.

Results:

A total of 1997 parents completed the questionnaire and were included in the final analysis. There were 1549 women (77.6%), and 448 men (22.4%). The majority of the participants are married and Saudis, the socio-demographics of participants are shown on table 1.

In terms of knowledge and actions taken during poisoning incidents, 36.7% of parents had a neutral stance on handling child poisoning, with 27.4% expressing confidence in their ability to manage such situations. 74.1% of parents knew whom to contact during a poisoning incident, while 25.9% did not have this knowledge. When a child ingested a poisonous substance, 44% of parents would take the child to the emergency room immediately, 26% would give milk, and 19.5% would attempt to induce vomiting. For inhaled poisoning cases, 45.9% would seek emergency medical help, while 40.9% would move the child to a well-ventilated area. In cases involving poisoning through eye or skin exposure, 43% of parents would rinse the affected area with cold water. table 2.

Most of participants stated that going immediately to the emergency room (92.9%) is crucial and helpful action for unconsciousness post poison exposure, followed by urging the child to vomit is helpful (88.2%).

The most commonly recognized symptoms of poisoning included unconsciousness (91.2%), vomiting (90.3%), difficulty breathing (88.2%), and abdominal pain (88.2%). However, only 31.8% of parents reported having first aid skills, emphasizing the need for increased awareness and training in managing poisoning emergencies effectively, table 4.

Opinions on the disappearance of symptoms post-poisoning incident varied among parents. 39.4% of the parents reported that the disappearance of symptoms after a poisoning incident indicate that it is a reassuring sign that indicates the child is in good condition while 18.9% reported that the disappearance of symptoms after a poisoning incident indicate that it is an alarming sign that requires immediate intervention. On the other hand, 35 % they don't know what the disappearance of symptoms after a poisoning incident indicates while only 6.7% of the parents reported that the disappearance of symptoms after a poisoning incident does not indicate anything, table 5.

31.8% of parents had received First Aid training, while 68.2% had not. Parental confidence levels in administering first aid for poisoning incidents ranged from very unconfident to very confident, with a significant portion feeling neutral about their abilities. the majority were neutral (34%), 25% were unconfident and 17.7% were Very unconfident. On the other hand, Only 4% of respondents were very confident, and 19.5% were confident. These findings indicate that a significant number of parents lack confidence in handling poisoning emergencies effectively, table 6. The results from the Chi-Square test show a statistically significant association between gender and confidence levels (p -value < 0.05, degrees of freedom = 4). This suggests that confidence levels significantly differ between male and female respondents. Specifically, 22.1% of males identified as "unconfident," compared to 19.0% of females, while 26.0% of females reported being "confident." These variations highlight the need for further investigation into how gender influences perceived confidence.

Table 1. Socio-demographics of participants:

		N	%
Sex	Male	1549	77.5
	Female	448	22.6
Marital status	Divorced/separated	128	6.4
	Married	1817	90.9
	Widow	52	2.6
Nationality	Non-Saudi	115	5.75
	Saudi	1882	94.24
Father's education	College	1090	54.5
	High School	448	22.4
	Lower School	151	7.56
	Postgraduate	308	15.4
Mother's education	College	1332	66.7
	High School	387	19.3
	Lower School	127	6.3
	Postgraduate	151	7.5

Table 2. Perception regarding response to Paediatric Poisoning Incident:

Item	Frequency	Percent
I know how to deal with a child poisoning Incident.		
- Strongly Disagree	218	10.9
- Disagree	398	19.9
- Neutral	733	36.7
- Agree	547	27.4
- Strongly Agree	101	5.1
Know who to contact in case of poisoning Incident.		
- Yes	1480	74.1
- No	517	25.9
If a child swallowed a poisonous substance, I would:		
- Give Milk	517	25.9
- Give Water	72	3.6
- Give Acid Agents	33	1.7
- Induce Vomiting	390	19.5
- Encourage Child to spit the toxin	106	5.3
- Go to ER immediately	879	44
If a child inhaled a poisonous substance, I would:		
- Give Milk	101	5.1
- Give Water	51	2.6
- Give Acid Agents	28	1.4
- Induce Vomiting	60	3
- Encourage child to spit the toxin	21	1.1
- Go to ER immediately	918	45.9
- Move child to an area with fresh air	818	40.9
If a child applied a poisonous substance to skin, I would:		
- Apply Oil	38	1.9
- Apply Toothpaste	43	2.2
- Wash with Soap	141	7.1
- Wash with Warm Water	206	10.3
- Wash with Cold Water	853	42.7
- Go to ER Immediately	716	35.8
If a child had a poisonous substance to eyes, I would:		
- Apply Eye Drops	89	4.5
- Wash with Soap	47	2.4
- Wash with Warm Water	294	14.7
- Wash with Cold Water	861	43.1
- Go to ER Immediately	706	35.3

Table 3. Parents shared insights on handling unconsciousness post-poison exposure.

Item	Helpful	Not Helpful
urge the child to vomit	88.2	11.8
give the child water, milk, juice	35.3	64.7
try to wake the child	81.2	18.8
Urge the child to spit out the remaining toxins	67	33
Putting hands on the child's mouth	19.6	80.4
lay the child on his back	21.3	78.7
put the child on his side	71.6	28.4
Take a picture of the poisoning substance	88.1	11.9
go Immediately to the emergency	92.9	7.1

Table 4. Determine whether the following Symptoms make you more suspicious of the possibility of poisoning in a child or not

	Yes	No
Cough	53.1	46.9
Vomiting	90.3	9.7
Wheezing when breathing	68.6	31.4
Pain in the chest or throat	71.5	28.5
Abdominal pain	88.2	11.8
Diarrhea	81.8	18.2
Seizure	81.1	18.9
Change in the skin and lips colour to blue	88	12
High body temperature	68.5	31.5
Crying	62.8	37.2
Difficulty breathing	88.2	11.8
Difficulty talking	80.5	19.5
Skin dryness / skin redness	83.1	16.9
Scratches / simple burns	66.4	33.6
Eye irritation / redness	81.5	18.5
Psychosis / agitation	77.3	22.7
unconsciousness	91.2	8.8

Table 5. What does the disappearance of symptoms after poisoning incident indicate:

	Frequency	Percent
It is an alarming sign that requires immediate intervention	378	18.9
It is a reassuring sign that indicates the child is in good condition	787	39.4
I don't know	699	35.0
The disappearance of symptoms does not indicate anything	133	6.7

Table 6. First Aid and self-perception:

Item	Frequency	Percent
Received First Aid Training		
- Yes	636	31.8
- No	1361	68.1
Your confidence in your first aid ability in dealing with poisoning incident of a child after exposure to toxic substance:		
- Very Unconfident	351	17.6
- Unconfident	500	25
- Neutral	679	34
- Confident	390	19.5
- Very Confident	77	3.9

Table 7. Mothers' Level of Education and Level of Confidence

		Very Unconfident	Unconfident	Neutral	Confident	Very Confident	P Value
College	Mothers	237 (17.8%)	346 (26%)	469 (35.2%)	236 (17.7%)	44 (3.3%)	< 0.05,
High School		68 (17.6%)	92 (23.8%)	126 (32.6%)	88 (22.7%)	13 (3.4%)	
Post-Graduate		22 (14.6%)	41 (27.2%)	45 (29.8%)	29 (19.2%)	14 (9.3%)	
Lower School		24 (18.9%)	21 (16.5%)	39 (39.7%)	37 (29.1%)	6 (4.7%)	
College	Fathers	174 (16%)	275 (25.2%)	401 (36.8%)	205 (18.8%)	35 (3.2%)	> 0.05
High School		97 (21.7%)	102 (22.8%)	132 (29.5%)	100 (22.3%)	17 (3.8%)	
Post-Graduate		54 (17.5%)	84 (27.3%)	96 (31.2%)	57 (18.5%)	17 (5.5%)	
Lower School		26 (17.2%)	39 (25.8%)	50 (33.1%)	28 (18.5%)	8 (5.3%)	

Analysis of the relationship between parental education and confidence levels revealed a statistically significant association with mothers' education levels (p -value < 0.05, degrees of freedom = 12). Among mothers with a college education, 26% (346 respondents) reported feeling unconfident, while 35.2% (469 respondents) were neutral. This suggests that maternal education influences confidence levels in managing poisoning cases. However, no statistically significant association was found between fathers' education levels and confidence levels (p -value > 0.05). Among fathers with a college education, 36.8% (401 respondents) reported feeling neutral, while 25.2% (275 respondents) were unconfident. Although not statistically significant, these findings suggest a possible relationship that warrants further investigation, table 7.

Discussion:

Regarding the first aid knowledge among parents in how to deal with a poisoning incident, only 5.1% of the parents strongly agreed that they knew how to deal with a child poisoning situation, which as shown in another study that assessed the first aid knowledge among parents of preschoolers, a mere 4.3% had proper first aid knowledge [7]. Another study done in Egypt showed that only 56.20% of mothers had adequate first-aid practices in cases of children poisoning [10]. This elucidates the importance of spreading awareness and first aid knowledge among parents and caregivers. Multiple studies highlight the significance of first aid training, courses, and campaigns for parents and caregivers to mitigate the incidence of unintentional child poisoning and other emergencies. In Al-Madinah, Saudi Arabia, a study revealed that 97.2% of parents were aware of first aid, while 93.3% believed in the necessity of first aid training. However, only 34.6% had attended actual training courses [8]. Similar to our study, only 31.8% of parents reported having first aid skills, emphasizing the need for increased

awareness and training in managing poisoning emergencies effectively. Furthermore, 25% of participants rated their abilities to be unconfident if they encountered a poisoning incident in a child. These differences could be reflected by various educational levels in our study, mothers with a college education, 26% reported feeling unconfident, while 35% were neutral. This suggests that maternal education influences confidence levels in managing poisoning cases. Moreover, a conducted research in Qassim, Saudi Arabia highlighted the prevalence of home-related injuries among children under five years old [9]. Mothers exhibited varying levels of knowledge about first aid, mostly being insufficient. The study recommended increasing awareness and organizing first aid training courses to enhance mothers' knowledge and practices, thus curbing the morbidity and mortality associated with home injuries among children. In summary, the studies collectively emphasize the importance of first aid training, courses, and campaigns for parents and caregivers in reducing the occurrence of accidental child poisoning and other emergencies. Enhanced knowledge and practices in first aid hold the potential to significantly improve children's safety and well-being within the home environment.

According to the published studied, it was reported that mothers predominantly acquired first aid knowledge from social media platforms [9,14]. Also, a research conducted by Bashekah et al. uncovered that media, particularly television, as a prominent source of information on first aid [15]. From the prevalent influence of social media and internet resources to the role of traditional media and personal experiences, these findings illustrate the importance of tailored educational efforts that encompass a wide range of sources to enhance parents' preparedness and response to childhood poisoning incidents.

39.4% of participants considered the disappearance of symptoms after poisoning incident

to be a reassuring sign that indicates the child is in good condition. Some children who have been exposed to toxins may not exhibit immediate symptoms [16]. It is essential for these individuals to undergo close observation and receive follow-up care to monitor their health status [16]. Our survey asked the parents how they would deal with specific poison incidents their children could face, the parents' response revealed a large gap between the international first aid guidelines [17] and parents' first aid knowledge. For instance, when their child ingests a poison, 44% of parents will go to the emergency room immediately, while 25.9% will give their child milk. In reality, giving milk after ingesting poison should be done if the patient was in a remote area or after being instructed by the poison control center. another study showed that some harmful first aid practices were also made by some caregivers as 29.5% of them induced children vomiting after poisoning [11]. More than forty five percent of parents will also go to the emergency immediately in case of respiratory system poisoning "inhalation incident"; however, what actually should be done first is taking the child to fresh air [17], as 40.9% of the parents will do. Regarding poisoning through the eyes and skin, this study showed that more than 40% of the parents will do the right action which is to clean the affected area with water [17]. Similarly, a local study has shown that mothers have the ability to administer initial aid for eye injuries [9]. This suggests that parents had limited knowledge about ingestion and inhalation first aid practices, but had a good knowledge about first aid practices for eyes exposed to toxic product.

Conclusion:

Our study highlights a significant awareness among parents regarding the importance of immediate action, with majority of the parents recognizing the necessity of taking a child to the emergency room post-poison exposure. However, there remains a notable gap in first aid training, as only 31.8% of parents reported receiving such training. Parental confidence in applying first aid varied, with a majority feeling neutral, unconfident, and very unconfident about their abilities. This emphasizes how crucial it is to improve parental knowledge and preparedness when it comes to managing child poisoning cases. We suggest that first aid campaigns should be done regularly to all community members.

Recommendation and Limitations:

As the study methodology involved distributing an online questionnaire, it could be susceptible to response bias and fatigue due to the survey's length. However, the authors tried to minimize biases or duplications by giving participants an iPad or phone to fill out the form to ensure that only one response is submitted per participant, avoid any duplicates that may occur under the supervision of data collectors upon filling out the form, or prevent external utilization of help (ChatGPT, search engines, or asking friends/family). Despite it being a cross-sectional study, this research shed light on the lack of first-aid skills related to among parents in Saudi Arabia, particularly concerning the vulnerability of children to ingesting/inhaling poisoning products. Therefore, it is crucial to promote increased awareness of the importance of first-aid skills by arranging public health awareness campaigns by hospitals and medical colleges. Also, government agencies like the Minister of Health can cooperate to send messages or brochures to all citizens in Saudi Arabia. Moreover, physicians may use social media platforms to distribute and share accurate first-aid information and offer complimentary first-aid training courses tailored for new or first-time parents. Such measures are essential for equipping parents with the necessary knowledge and skills to respond to poisoning incidents effectively.

Authors' Contributions

AK, BA, MK, YA, YS, NA, MA, and RR conducted the study. AK, BA, MK, YA, YS, and RR collected data. MA provided statistical advice and study design and analyzed the data. AK, BA, MK, YA, YS, RR and MA drafted the manuscript. MN took responsibility and supervised the study. All authors reviewed the study. All the authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Institutional Review Board Statement

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the IRB Committee at King Abdullah International Medical

Research Center (KAIMRC). Study number NRJ23J/297/11.

Informed Consent Statement

Informed consent was provided by the participants before completing the survey, as this was a cross-sectional study.

Data Availability Statement

The datasets used and/or analyzed in the current study are available from the corresponding author upon reasonable request.

Conflict of Interest Statement

The authors declare no conflict of interest.

Declaration of Generative AI and AI-assisted technologies:

During the preparation of this work the authors used ChatGPT 4.0 and Google Gemini in order to enhance the writing of this manuscript only. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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