

IJMA



INTERNATIONAL JOURNAL OF MEDICAL ARTS

Volume 3, Issue 1 (Winter 2021)

<http://ijma.journals.ekb.eg/>

Print ISSN: 2636-4174

Online ISSN: 2682-3780

About IJMA

- International Journal of Medical Arts is the Official Journal of the Damietta Faculty of Medicine, Al-Azhar University, Egypt
- The First Issue was published in July 2019
- It is an International, Open Access, Double-blind, Peer-reviewed Journal
- Published four times a year
- Published under the following license: Creative Commons Attribution-ShareAlike 4.0 International Public License (CC BY-SA 4.0). It had updated from the Creative Commons license [CC BY] in volume 2, Issue 4, October 2020
- The Egyptian Knowledge Bank hosts the web site of IJMA
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- IJMA is listed in Index Copernicus
- IJMA is listed in Publons, as EKB is an official partner with Clarivate Analytics





Available online at Journal Website
<https://ijma.journals.ekb.eg/>
Main Subject [Basic Science [Community Medicine]]*



Original article

Unintentional Poisoning among Preschool Children in Jeddah, Saudi Arabia (2014-2016): A retrospective Cohort Study

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Received at: August 13, 2020; Revised at: October 14, 2020; Accepted at: October 20, 2020

DOI: [10.21608/IJMA.2020.42737.1168](https://doi.org/10.21608/IJMA.2020.42737.1168)

ABSTRACT

Background: Acute unintentional home intoxication in preschool-age children is a major cause of preventable morbidity and mortality. In the United States, 2012, around half of the youngsters younger than 6 years were accounted for as a poison occasion.

Aim of the work: To estimate family and poison injury characters of preschool children who had unintentional home poisoning at poisoning department center under public health administration in Jeddah City, Saudi Arabia, during the duration between 2014-2016 and to recognize the relationship between unintentional poison' risk factors (personal, family character and injury factors) and poison types.

Methodology: This retrospective cohort study was proceeded in the Jeddah poison center. All preschool children (0-5) years involved were reported as unintentional household harm (poisoning) cases at the chosen center. The questionnaire had developed and validated "from three public health experts," which was filed from center files and completed by a researcher telephone call to child-parent.

Results: 41.5% of the affected children were occupied the (>12-24 months) age cluster. In addition, 62.6% of the participants were males, and most of the kids [44.4%] had a low social class.

Conclusion: Inadvertent poisoning was commonly associated with age cluster (1-2 years), male gender, families with greater than three children, mother higher education, medicine poisoning of powder form, oral route, and at the morning time.

Keywords: Unintentional poison; Preschool children; Poison-types; Retrospective; Cohort study.

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Please cite this article: Salem IMW, Natto A, Sweif MM. Unintentional Poisoning among Preschool Children in Jeddah, Saudi Arabia (2014-2016). A retrospective Cohort Study. *IJMA* 2021; 3[1]: 953-961. DOI: [10.21608/IJMA.2020.42737.1168](https://doi.org/10.21608/IJMA.2020.42737.1168)

* Main subject and any subcategories have been classified according to the research topic.

INTRODUCTION

Harming [poison] was characterized as an introduction of a person to a substance that can cause manifestations and indications of organ brokenness prompting injury or dying. Acute unintentional house poisoning in the preschool age is a significant reason of preventable morbidity and mortality. In the United States, 2012 more than 1.4% were under 20 years' elderly participants and approximately 50% of kids aging less than 6 years were reported as a poisoning event [1].

In 2004, the US hospital emergency divisions estimated that nearly 86000 childhood poisoning incidents were treated [429.4 poisonings /100000 children][2].

The toxin conditions and their related danger factors generally change across various geographic areas worldwide due to variation in social, environmental & economic factors and their accessibility and availability[3].

Unintentional injuries are the main reason of about 90% of youngster's passing coming about because of wounds or force [4].

The house is the most ordinary for inadvertent youth injuries, where they spend most of their time. Low and moderate-pay nations hold over 95% of the child's injuries and 80% of its mortality. It likewise influence wellbeing, instruction, and family economy of the harmed [poisoned] youngsters [5].

Related to the kind of poison, Studies have recorded kerosene, petrol, medicines, insecticides, and household cleaning products are the major hazards for poisoning incidents among young children [6].

AIM OF THE WORK

1.To assess the personal, family, and poison injury characters of the preschool kids who had an unexpected house harming by the poison at the poisoning department center under the public health administration in Jeddah city, Saudi Arabia, during the duration between 2014-2016.

2.To identify the link between the unintentional poison' risk factors [personal, family and injury factors] and the poison types among the preschool

children who had an unintentional home poisoning at the same place and duration.

MATERIALS AND METHODS

The current review accomplice retrospective cohort study was led in Jeddah poison center for three years. The institutional ethical board approved the study, and all the participants were informed about the study, and consent was obtained from all. All preschool children [0-5] years involved who were reported as unintentional household poisoning affected kids at the poisoning department under the public health administration in Jeddah city during the years 2014-2016 were included.

In the year 2014, instances of [poison] harming were [n= 116], 2015 were [n= 114] and 2016 [n= 143] in Jeddah, which were divided on two poisoning centers in the Ministry of Health, one Poison Control Center, medicinal chemistry legitimacy and the other at the public health administration, department of occupational and environmental health, poisoning department. The existing research was done from the public health administration, the division of occupational and environmental health, and the poisoning department, where all recorded cases [0-5 years] were attached by telephone. Subjects with a vague diagnosis of poisoning, incomplete records, and refusal to converse with the researcher were barred from the research.

The questionnaire had developed and validated "from three public health experts" data collection forms, which were pretested by the pilot study results. It was designed from previous similar literature reviews [hazard factors] and completed from recorded data files from the chosen center, e.g. [demographics, some poison characteristics] and completed by the researchers attaching with the child-parent by a telephone call, e.g., interviewer relation to a child, parents' features such as age, sex, nationality, education, number of children, recorded. Features of the domestic residence, such as siblings, etc., were noted and recorded. Poisoning substance [the cause, physical form, and place], were also recorded. Type and mode of exposure and kind of management were additionally registered.

Statistical analysis: The information [dataset] was coded and entered SPSS software version 22. SPSS [Statistical Product and Service Solutions]: An IBM Company [International Business Machines Corporation, an American multinational technology company headquartered in Armonk, New York]. Ceased to exist, which is now fully integrated into the IBM Corporation, and is one of its brands. The data were described and cleaned before analysis. The numerical data were represented by mean and standard deviation [SD]. Proportions and Chi-Square described the qualitative variables. Regression models were used for a multivariable analysis that was done to detect risk factors. A P value of ≤ 0.05 was viewed as significant.

RESULTS

Table [1] described the personal and family features for the unintentional home poisoned cases. This study showed that most of the poisoned kids (41.5%) were occupied the [>12 -24 months] age group. 62.6% of the participants were male, and most of the poisoned child 44.4%, had a low social class. 42.7% of the kid's mothers had a university education or more. Divorce was recorded between 60.2% of child families. 88.3% of the shared kids had a big family (>3 members). It also illustrated poison injury characteristics. The mother was the first observer among 70.8% of the contributors.

Concerning the kind of poison, 40.9%, 30.4% & 28.7% of the participants were poisoned by medicine, cleaning agents & Pesticides/insecticides, respectively. 44.4% of the affected children were poisoned by a powder form of poison, which was stocked in a bathroom among 49.7% of the participated child, was accessible among 88.3%, and 71.1 of it was stored in its potentially poisonous substance container. Concerning the poison exposure, 69% of the cases were presented to it orally, and 50.3% had gastrointestinal symptoms & signs. Only 0.7 % & 15.2% of the poisoned kids had a delay in health arrival & reaction in the health institutions, respectively. 72.5% of the participants arrived at

the health institutions in a stable condition.

Table [2] represented the classification of the dangerous factors affecting the children's unintentional home poisoning as per to the poison's types. A critical difference was noticed in-between the poison type and the year of toxic substance $P \leq 0.05$ where the medicine form was increased by year [22.8%, 42.1% & 57.9% in 2014, 2015 & 2016 respectively], facing to the insecticides form which decreases by years [42.1%, 24.6% & 19.3% in 2014, 2015 & 2016 respectively]. Also, the low social class used the medicine form 52.6% more than the other form, while 40.0% of a high social class used the pesticide kind of poison, and those differences were statistically significant $P \leq 0.05$. 61.8 % of the hyperactive child used medicine type of poison compared to only 5.9% of them used an insecticide type [$P \leq 0.05$]. 87.1%, 89.3%, 33.3% & 10.6% of the toxin storage was in a kitchen, living room, bathroom & 10.6% was a medicine type [$P \leq 0.05$]. 68.4% of the inhaled poison was an insecticide type, while 55.9% of oral exposure & 57.9% of ocular exposure were medicine & cleaning agent, respectively [$P \leq 0.05$]. 50.0% of the harm that occurred at A.M. faced to 29.9% occurred at P.M. from medicine type $P > 0.05$.

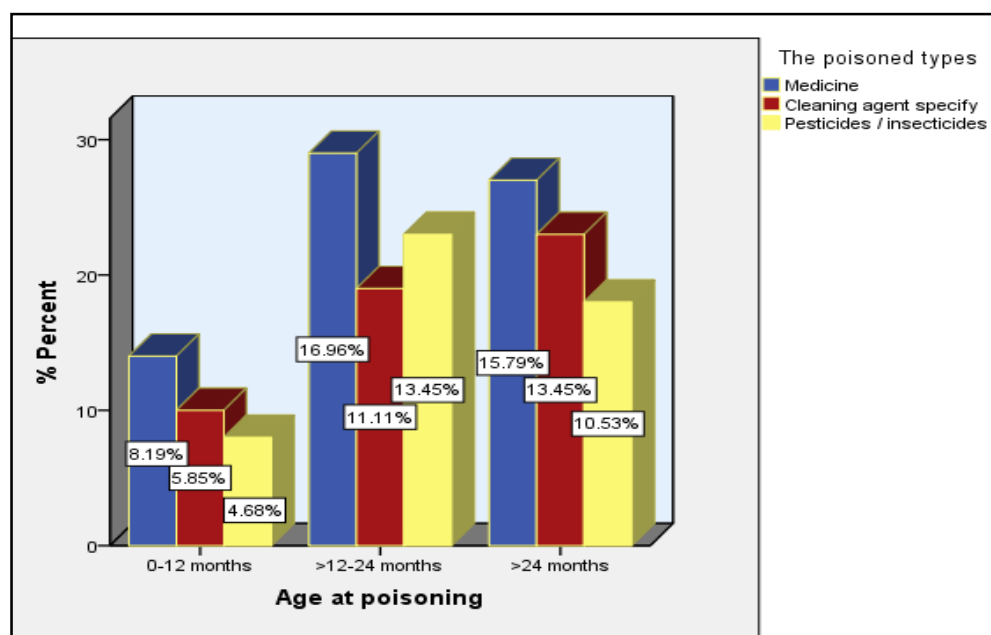
Table [3] outlined the multivariable logistic regression analysis of potential elements for the poison types of accidental home harming among the preschool kids poisoned cases. The dangers of exposure to the medicine type of the toxin were believed to be [OR= 21.8, 5.6, 4.02, 2.14, 2.37 & 1.22 times] among a solid form of the toxin, the year 2015, hyperactive child, accessible toxin substance, low social class, and AM exposure respectively compared to the pesticides/Insecticides type of poison.

Graph [1] presented the cases' appropriation regarding the poison type and their age. The highest percentages [41.4% & 46.9%] of medicine, pesticide/insecticides were occupying the same age group [0-12months] while 44.2.8% of cleaning agents had the age group [>24 months] $P > 0.05$.

Table [1]: descriptive table of the variables affected the unintentionally home poisoned among a preschool child. Data were expressed as number and (%).

Variables		Studied Cases (171)	
		No	%
Age of toxin categories	≤ 12 months, >12-24 months >24 months]	23, 71 68	18.7%, 41.5% 39.8%
Age of toxin incidence (months)	mean±SD; Min.-Max.	25.28±11.69; 1-54	
Gender	Male Female	107 64	62.6% 37.4%
Social classes	[Low, Middle, High]	76, 65, 30	44.4%, 38.0%, 17.5%
Matrimonial status	[Married, Divorced]	68, 103	39.8%, 60.2%
Child mother' Educational level	Read and write or illiterate, Primary education	18, 13	10.5%, 7.6%
	Preparatory education, Secondary education	22, 45	12.9%, 26.3%
	University education or more	73	42.7%
Sibship	[Single child, ≥2 children]	18, 153	10.5%, 89.5%
The rank of the kids in his/her family	1 st or 2 nd , 3 rd or 4 th , 5 th or 6 th or more	112, 41, 18	65.5%, 24.0%, 10.5%
The poisoning type	[Medicine, Cleaning agent, Pesticide]	70, 52, 49	40.9%, 30.4%, 28.7%
Forms of the poisoning	[Powder, Solid, Liquid]	76, 35, 60	44.4%, 20.5%, 35.1%
The time of exposure to poisoning	[AM, PM]	94, 77	55%, 45%
The storage place of the poisoned material	Bathroom, Bedroom, Kitchen, Living room	85, 31, 27, 28	49.7%, 18.1%, 15.8%, 16.4%
The accessibility of the storage place of poisoning	Accessible, Not accessible	151 20	88.3% 11.7%
The storage container of poisonous substance	The same potentially poisonous substance container	122	71.3%
	A different container like (water bottle, Pepsi bottle...	49	28.7%
Mode of exposure to poisoning	[Oral, Inhalation, Ocular, Unknown]	118, 19, 19, 15	69.0%, 11.1%, 11.1%, 8.8%
Main symptoms & signs	GIT, CNS, CVS	86, 50, 35	50.3%, 29.2%, 20.5%
The health care arriving	[Delayed, Not delayed]	12, 159	7.0%, 93.0%
Reaction of the health institution	[Rapid, Delayed]	145, 26	84.8%, 15.2%
The patient state at the time of access to a health institution	Stable, Unstable	124, 47	72.5%, 27.5%

AM: Antemeridian, PM: postmeridian, GIT: gastrointestinal tract, CNS: Central Nervous system, CVS: Cardiovascular system



Graph [1]: Distribution of cases regarding their age at the time of poisoning

Table [2]: Classification of the risk factors affecting the child's unintentional home poisoning according to the poison's types.

	The Poisons' type						Significant Level P. value
	Medicine(70)		Cleaning agent (52)		Pesticides(49)		
	No	%	No	%	No	%	
Year of the poisoning:							
- 2014	13	22.8%	20	35.1%	24	42.1%	<0.001*
- 2015	24	42.1%	19	33.3%	14	24.6%	
- 2016	33	57.9%	13	22.8%	11	19.3%	
Nationality:							
- Saudi	26	28.9%	35	38.9%	29	32.2%	<0.001*
- Non-Saudi	44	54.3%	17	21.0%	20	24.7%	
Social class:							
- Low class	40	52.6%	22	28.9%	14	18.4%	0.02*
- Middle	23	35.4%	19	29.9%	23	35.4%	
- High class	7	23.3%	11	36.7%	12	40.0%	
Child hyperactivity:							
- Yes	21	61.8%	11	32.4%	2	5.9%	<0.001*
- No	49	35.8%	41	29.9%	47	34.3%	
The storage place of the poisoned material:							
- Bathroom	9	33.3%	11	40.7%	7	25.9%	<0.001*
- Bedroom	9	10.6%	39	45.9%	37	43.5%	
- Kitchen	27	87.1%	0	0.0%	4	12.9%	
- Living room	25	89.3%	2	7.1%	1	3.6%	
The accessibility of the storage place of poisoning:							
- Accessible	57	37.7%	50	33.1%	44	29.1%	0.04*
- Not accessible	13	65.0%	2	10.0%	5	25.0%	
The storage container of poisonous substance:							
- The same potentially poisonous substance container	16	32.7%	11	22.4%	22	44.9%	0.01*
- A different container like (water bottle, Pepsi bottle...	54	44.3%	41	33.6%	27	22.1%	
Forms of the poisoning:							
- Powder	6	7.9%	30	39.5%	40	52.6%	<0.001*
- Solid	33	94.3%	1	2.9%	1	2.9%	
- Liquid	31	51.7%	21	35.0%	8	13.3%	
Mode of exposure to poisoning:							
- Oral	66	55.9%	29	24.6%	23	19.5%	<0.001*
- Inhalation	2	10.5%	4	21.1%	13	68.4%	
- Ocular	0	0.0%	11	57.9%	8	42.1%	
- Unknown	2	13.3%	8	53.3%	5	33.3%	
The time of exposure to poisoning:							
- A.M	47	0.50%	23	24.5%	24	25.5%	0.02*
- P.M	23	29.9%	29	37.7%	25	32.5%	
The reaction of the health institutions:							
- Rapid	66	45.5%	39	26.9%	40	27.6%	0.01*
- Delayed	4	15.4%	13	50.0%	9	34.6%	

Table [3]: Multivariable conditional logistic regression analysis of potential factors for unintentional home poisoning among preschool children poisoned cases.

Variable	Sig. P. value	OR	95% C.I.	
			Lower Bound	Upper Bound
Medicine				
Year of poison:				
- 2014	0.40	2.207	0.348	14.005
- 2015	0.04*	5.632	1.018	31.158
Nationality:	0.26	0.494	0.141	1.725
- Saudi				
Social class:				
- Low	0.310	2.374	0.434	12.973
- Moderate	0.53	0.590	0.114	3.060
- High				
Child hyperactivity:	0.15	4.022	0.602	26.881
- Yes				

Variable	Sig. P. value	OR	95% C.I.	
			Lower Bound	Upper Bound
Accessibility of the poison: - Accessible	0.34	2.149	0.443	10.421
The storage container of poisonous substance: - The same potentially poisonous substance container.	0.50	0.663	0.197	2.226
Poison forms - Powder	<0.001*	0.045	0.009	0.224
- Solid	0.01*	21.823	2.039	233.563
Time of exposure: - AM	0.74	1.223	0.366	4.086
The reaction of the health institutions: - Rapid	0.89	.881	0.129	6.034
Cleaning agent				
Year of poison: - 2014	0.87	1.130	0.233	5.470
- 2015	0.18	2.705	0.614	11.919
Nationality: - Saudi	0.23	1.854	0.672	5.116
Social class: - Low	0.46	1.627	0.445	5.945
- Moderate	0.53	0.676	0.197	2.318
Child hyperactivity: - Yes	0.11	4.442	0.687	28.709
Accessibility of the poison: - Accessible	0.25	1.988	0.605	6.541
The storage container of poisonous substance: - The same potentially poisonous substance container.	0.04*	0.342	0.123	0.954
Poison forms - Powder	0.08	0.288	0.071	1.167
- Solid	0.56	0.404	0.019	8.800
Time of exposure: - AM	0.30	0.608	0.234	1.579
The reaction of the health institutions: - Rapid	0.07	0.322	0.094	1.100

The reference category is Pesticides / Insecticides, * Indicate significance

DISCUSSION

In the current study, the most affected age group with acute unintentional poisoning was >12-24 months (41.5%), >24 months (39.8%), while the age class 0-24 months occupied 18.7%. Other [3] reported that age category 2-4 years were highest in acute unintentional poisoning [51.0%] then 1-2 years (35.7%) and 4-5 years (13.3%). Children <6 years are at a greater danger of unintentional poisoning as they pass the most time at the house and cannot manage hazards [7].

Infants are less affected due to the failure to move around, limited capacity to open containers, and attention paid to them by family. On the contrary, others [8] reported that most of harming happened at ages 12-24 months.

In a present study, boys are predominately

more influenced than girls [62.6% versus 37.4%, 1.67:1]. This ratio was near that recorded in Malaysia [1.6:1] [9], United Arab Emirates [1.35:1] [10], Sri Lanka [1.29:1] [3]. Male kids are more active than females, which is responsible for their higher poisoning incidences. Meanwhile, others reported no sex differences regarding poisoning risk [11].

In the present study, low social class has the greatest poisoning incidence [44.4%], then middle class [38.0%], and lastly, high class [17.5%]. Meanwhile, others [3] observed an insignificant relation between economic problems and poisoning.

This study showed higher childhood poisoning between parents with higher education for mothers [42.7%] as another literature [12]. The poisoning percentage declined with increased parents' education level in India [13] and Sri Lanka [3]. In the

persisted study, accidental poisoning increased with elevated family members >3 [88.3%] and siblings ≥ 2 children [89.5%] as children become neglected by their families as others [14]. The current results also mentioned that when the kids rank is 1st or 2nd are more vulnerable to poisoning [65.5%], that explained by less information regarding the handling of the first or second child. In contrast, Halawa et al.[12] announced that second and third conceived kids were at elevated poison injury hazard. The poisoning incidence observed in the running study was higher among children with divorced parents [60.2%]. Greater inadvertent harm is related to youngsters not living with the two guardians [15]. Meanwhile, Ahmed^[8] reported an insignificant association between parents living apart and poisoning. Others^[3] observed that lacking management was multiple times more normal among kids with unexpected harming versus control.

Medicine was the generality poisoning cause among children [40.9%], then cleaning agents [30.4%], and lastly pesticides/ insecticides [28.7%] in the present study. The same toxicity patterns were noticed in the Middle East [16], Europe [17], and North America^[18], where drugs were the commonest poisons. Medicine poisoning was highest between low class [52.6%] while cleaning agents and pesticides were highest in-between high class [36.7% and 40.0%]. Other [7] detailed that relative being on long haul drug was related with a fundamentally higher danger for therapeutic harming. In Saudi Arabia, childproof caps are not widely used in medication packaging. In this study, non-pharmaceutical pediatric poisonings were cleaning agents [30.4%] and then pesticides/ insecticides [28.7%]. Dayasiri et al. [7] reported that pesticides were the least normal kind of toxin as guardians were more forewarned in pesticide stockpiling. The commonest poisoning agent was pesticides in India [19], cosmetics and personal nursing products in the United States [1], cleansing products in China [20], and kerosene in Kuwait [21], Bahrain [22], Nigeria [23]. The introduction recurrence reflects item accessibility, home openness to a youngster, and bundling, as opposed to inalienable poisonousness. Poison form in this study was mostly powder [44.4%] than

liquid [35.1%] and lastly, solid [20.5%], like findings from neighboring countries [24]. Solid is a high risk for medical poison [OR 21.823], while powder was protective [OR 0.045]. Those might explain that children find it attractive to taste colorful powdered substances.

In the present research, oral intoxication accounted for the highest proportion of affected cases [69.0%], followed by inhalation [11.1%], ocular [11.1%], and unknown [8.8%]. This occurred due to children's curious nature; they tend to put everything in their mouths to taste. Koh et al. [25] reported a large percentage of poison ingestions in Singapore among children was via the oral route [98.0%].

In the present study, poisoning material storage place was in the toilet [49.7%], bedroom [18.1%], living room [16.4%], and lastly kitchen [15.8%]. Keeping cleaning agents in their containers is protective against poisoning [OR 0.342]. Poisoning storage place was mostly accessible [88.3%], and storage container was mostly same potentially poisonous substance containers [71.3%]. Adnan et al. [9] reported that most guardians left their youngsters solo without supervision when they were in the toilet; in 76% of cases, harms were either effectively congenial or didn't have an appropriate capacity place^[26]. The consequences of this investigation indicated that gastrointestinal manifestations were most symptoms [50.3%] then the central nervous system [29.2%] and cardiovascular system [20.5%] among toxic cases. At hospital arrival, most of this study participants were in a stable state [72.5%]. Research in Hong Kong revealed that 68% of affected kids were asymptomatic, and in symptomatic ones, the commonest symptoms were gastrointestinal [52.0%] and neurological [44.0%]^[27]. Dayasiri et al.^[7] watched gastrointestinal side effects as the commonest clinical sign followed by respiratory and neurological indications. The commonest symptoms in kids with acute poisoning were neurological in many West Asia studies [28] and Europe [28]. In another study, the commonest symptoms were respiratory [62.8%] [23]. Variations cause patients' clinical symptoms related to type and amount of poison taken.

In the current study, 55.0% of poisoning accidents happened in the first part of the day, in accordance with Northern Jordan, where poisoning incidence during working hours was 80% [29]. In India, poisoning occurred between 8.00-11.00 A.M., a time when housewives were busy with their home chores^[30]. Full working parental management is required to be at night. Meanwhile, others reported that most poisoning occurs in the evening as it is children's playtime where home injuries are mostly reported during playtime^[31].

In this study, health care arrival was not delayed in the majority of the cases [93.0%]. Dayasiri et al. [7] noticed that 69.1% of children were brought to an initially care hospital/emergency unit within 1 hour of poison ingestion. In another study in Saudi Arabia, 69% sought medical assistance within 2 hours, while 31% waited >4 hours^[32]. Deferred introduction to the emergency unit is related to expanded inconveniences hazards.

Conclusion: Based on the results of the current study, it can be concluded that age category between one to two years, male gender, mothers that were having greater than three children, mother higher education, medicine poisoning and powder form, oral route, and morning time were commonest associated with accidental poisoning. Gastrointestinal signs were the most presented signs, and most of them were in stable condition when they reached the hospital.

Recommendation: Upgrading information and mindfulness through setting up workshops, public media, schools, wellbeing, and clinical focuses about poison types and how to forestall and manage them are significant strides in keeping up youngsters' wellbeing.

Ethical procedures: The study had been approved by the Department of Research and Studies, The Joint Program for Family and Community Medicine, which follows the Directorate of the Health Affairs in Jeddah Governorate, Saudi Arabia.

Financial and Non-Financial Relationships and Activities of Interest

None

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