International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

Risk Factors of Household Chemical Unintentional Poisoning Among Children (0-4) Years Old Reported at the Public Health Administration In Jeddah, Saudi Arabia From 2014 to 2016: A Case-Control Study

Ahlam Hamid Natto[1*], Iman Wahby[2], A.P. Adel Ibrahim[3]

[1*]Public Health Specialist, Joint Program of Family and Community Medicine, Jeddah, KSA.
[2]MBBS, MSC, PhD in Community Medicine, Associate Professor of Community Medicine, King Abdul Aziz University, Faculty of Medicine, Family and Community Medicine, Jeddah, KSA; Al Azhar University, Faculty of Medicine, Egypt.
[3]MD, MDPH, Biostatistics Advisor, Public Health Consultant, Research Department, Directorate of Health Affairs, Jeddah, KSA.

ABSTRACT

Background: Poisoning is an injury caused by a xenobiotic or a substance exogenous to the human body, which may lead to cell damage or death. It can enter the body through respiratory, gastrointestinal or skin routes, leading to acute or chronic problems according to dose and time. The present study aims to examine the risk factors of poisoning of preschool (0-4) years old in Saudi Arabia and to analyze the role of the parents and the characteristics of the house and the environment in these accidents.

Materials and Methods: The present case-controlled study were conducted in the Institute, State during one year. All preschool children (0-4) years involved reported as household poisoning cases in the poisoning department under the public health administration in Jeddah city during the years 2014-2016. Socio-demographic variables, e.g., interviewer relation to a child, parents' characteristics such as age, sex, nationality, education, occupation, marital status, number of children, etc. were recorded. Characteristic of the residence of the household such as a type of house, ownership, number of rooms, number of family and siblings, etc. were noted. All the data were arranged in a tabulated form and analyzed using SPSS software.

Results: The age of the studied groups of cases and controls children ranged from zero to 48 months, with the most commonly affected group was (13 to 24 months) which occupied 40.9 % of cases, while occupied 29.8% of controls. Besides, the mean age of cases was nearly double the mean age of controls (43.42 ± 16.084 and 16.37±11.535 respectively) so, there was a statistically significant difference ($P<0.05$) between cases and controls according to age group and mean of age. In 88.3 % of cases, the poisoning material is accessible to children and place from where the child can easily access the substance. The oral root of the poisoning substance occurred among of the cases 69% while only 49% of the cases had gastrointestinal manifestations. 72.5% of the cases were stable when they arrived at the hospital. 84.8% of families did not have a history of any health education about poisoning before the accident.

Conclusion: The tender's age was children aged 0 to 12 months. Data revealed significant results about the first baby, Saudi, male child, married mother, father had primary education, a mother with secondary education, housewife-mothers, owner house; and large family size. Oral, powdered form poisoning accounted for highest incidences.

Keywords: Childhood, Poisoning, Unintentional, Jeddah.

***Correspondence to:**

Dr. Ahlam Hamid Natto,
Public Health Specialist,
East Jeddah Hospital, Jeddah, Saudi Arabia.

Article History:

Received: 06-02-2019, **Revised:** 03-03-2019, **Accepted:** 27-03-2019

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2019.5.2.009	

INTRODUCTION

Poisoning is an injury caused by a xenobiotic or a substance exogenous to the human body, which may lead to cell damage or death. It can enter the body through respiratory, gastrointestinal or skin routes, leading to acute or chronic problems according to dose and time.[1] WHO report (2011), showed that there were about 315 000 recorded deaths due to poisoning all over the world. The economic burden of poisoning derives from the expensive treatment costs as well as the possible life years one lose

because of acute cases of poisoning.[2] WHO (2002), reported that Poisoning is a significant health problem worldwide; it is the ninth leading cause of death in young adults.[3] Centers for Disease Control, Prevention, CDC, (2006), in developed countries, e.g., United States, recorded that more than 50% of the cases of poisoning are due to over-the-counter medication, and mostly among children under 4-year age.4 Poisonings are said to account for about (2%) of accidental deaths in developed countries compared to (5%) in developing countries.[4] Worldwide, Peden et al., (2008), found that children under five years of age account for about 15% of unintentional poisoning-related deaths, and about 23% of DALYs lost globally is due to poisoning.[5] O'Brien, (2008) showed that the low and middle-income countries have higher mortality rates for unintentional poisoning among children at this.[6] Peden et al., (2010) in the EMRO region, recorded that, the mortality rates due to poisoning are 1.6 per 100,000 children. This age pattern of childhood poisoning should have an impact on the preventive measures parents should use to protect their children according to their age groups.[7]

The present study aims to examine the risk factors of poisoning of preschool (0-4) years old in Saudi Arabia and to analyze the role of the parents and the characteristics of the house and the environment in these accidents.

MATERIALS AND METHODS

The present case-controlled study conducted in the in Jeddah city for one year. All preschool children (0-4) years involved reported as household unintentional poisoning cases at the poisoning department under the public health administration in Jeddah city during the years 2014-2016. The institutional ethical board approved the study, and all the subjects were informed about the study, and written consent was obtained from all. At the age 2014, cases of poisoning were (116) 2015 were (114) and 2016 (143). In Jeddah, there are 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. Poisoning control center refused to give us data for ethical reasons. The study will be carried out in Jeddah city, where the cases will be selected from the records available at the public health administration, occupational and environmental department, poisoning center.

All children aged between 0-4 years, permanently residing in Jeddah and had poisoning as reported incident were included in the study. Subjects with a vague diagnosis of poisoning, incomplete records regarding age, time and refusal to converse with the researcher were excluded from the study. The controls had matched with age and gender with cases which were collected from 1ry health care centers in Jeddah. Per last statistical report (2016) from the public health administration center in Jeddah, the city divided into eight health sectors, so we chose one from each sector. These eight centers enrolled from children attending the vaccination and well-baby clinics at selected PHCs in Jeddah city during the year of the study. The systematic random sample selected the control children from the choosey centers. The researcher had developed and validated “from three experts” data collection forms (questionnaire) which pretested by a pilot study. It was designed from previous similar literature reviews (risk factors) and completed from recorded data files from the center of primary health care, administrated of public health (demographic data) recorded at public health administration, occupational and environmental health department at poisoning center in Jeddah city from 2014 through 2016. The control group will be enrolled from the children attending the Primary Health Care centers (PHC). Socio-demographic variables, e.g., interviewer relation to a child, parents' characteristics such as age, sex, nationality, education, occupation, marital status, number of children, etc. recorded. Characteristic of the residence of the household such as a type of house, ownership, number of rooms, number of family and siblings, etc. were noted. Poisoning substance (the cause, physical form, place), etc. were also recorded. Type and mode of exposure, outcome variable, the environmental domain, and kind of management were also recorded. The researcher attached with child-parent by a telephone call to fill the questionnaire which was completed from the file data. Confidentiality of the data.

The data will be coded and entered to Stata software version 13 the data will be described and cleaned before analysis. The descriptive data will be analyzed according to the type of variables: The quantitative data will be represented by means and Stander Deviation (SD). Proportions and Chi-Square will describe qualitative variables. Regression models may be used for multivariable analysis.

RESULTS

(A): UNIVARIATE ANALYSIS

Fig 1: Distribution of data according to case and control

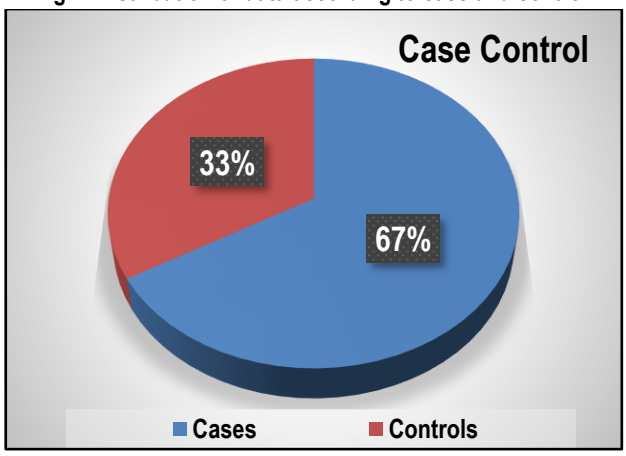


Fig 2: Distribution of data according to Gender

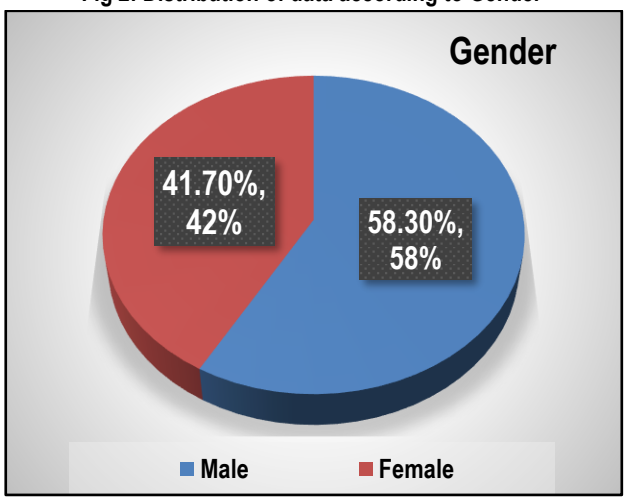
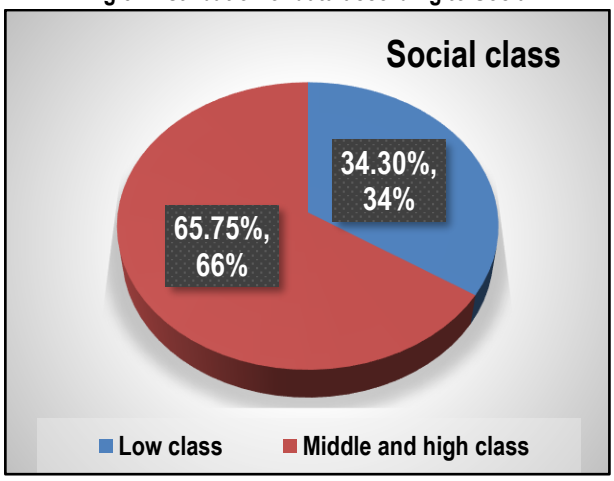


Fig 3: Distribution of data according to Social



(B): BIVARIATE ANALYSIS

Table 1 shows the distribution according to age by month from 0-48 to 2016 total case and control**:** The age of the studied groups of cases and controls children ranged from zero to 48 months, with the most commonly affected group was (13 to 24 months) which occupied 40.9 % of cases, while occupied 29.8% of controls. At the same time, most of the controls 44.7% were held group 1 (0-12monthes) while the same group 1 was occupied only 18.7% of cases. Also, the mean age of cases was nearly double the mean age of controls (43.42 ± 16.084 and 16.37±11.535 respectively) So, there were a statistically significant difference (P<0.05) between cases and controls according to age group and mean of age.

Table 2 illustrates the distribution of the studied sample according to some personal data. According to sex distribution, we found that male distribution between cases and controls were (62.6% & 56.1% respectively) while female distribution was (37.4% & 43.9% respectively). All those differences between cases and controls according to sex were statistically insignificant differences (P>0.05). Related to nationality, the results show that most of the cases were Saudi (52.6%), on the other hand, most of the controls were non-Saudi (60.8%), and those differences were statistically significant differences (P<0.05). Corresponding to the marital status of child parents, we see that there was no statistically significant difference between cases and controls because nearly all cases and controls have a married parent (95.3% & 94.2%).

Table 1: Distribution of studied population according to age by month from 0-48 months

Studied Groups		Cases (171)		Controls (342)		Total (513)		Significant Level
	Variables	No	%	No	%	No	%	P. value
Age by month (0-48 months):	0- <13 months (1 year)	32	18.7	153	44.7	185	36.1%	0.000*
	13- <25 months (2 years)	70	40.9	102	29.8	172	33.5%	
	25- <37 months (3 years)	49	28.7	68	19.9	117	22.8%	
	37-48 months (4 years)	20	11.7	19	5.6	39	7.6%	
Age by month (0-48 ms)	Mean ± S.D.	43.42 ± 16.08		16.37±11.53		25.39 ± 18.36		0.000*

Table 2: Division of the studied population according to some personal data:

Studied Groups		Cases (171)		Controls (342)		Total (513)		Significant Level
	Variables	No	%	No	%	No	%	P. value
Gender	Male	107	62.6%	192	56.1%	299	58.3%	0.164
	Female	64	37.4%	150	43.9%	214	41.7%	
Nationality	Saudi	90	52.6%	134	39.2%	224	43.7%	0.004*
	Non-Saudi	81	47.4%	208	60.8%	289	56.3%	
Marital status of child parents	Divorced	8	4.7%	20	5.8%	28	4.7%	0.583
	Married	163	95.3%	322	94.2%	485	94.5%	

Table 3: Distribution of the studied sample according to social status:

Studied Group		Cases (171)		Controls (342)		Total (513)		Significant Level
	Variables	No	%	No	%	No	%	P. value
Social class	Low class	42	24.6%	134	39.2%	176	34.3%	0.001*
	Middle and high class	129	75.4%	208	60.8%	337	65.75	
Educational level of child father	Primary education	13	7.6%	34	9.9%	47	9.2%	0.014*
	Preparatory education	27	15.8%	42	12.3%	69	13.5%	
	Secondary education	41	24.0%	125	36.5%	166	32.4%	
	University education or more	90	52.6%	141	41.2%	231	45.0%	
Occupation of child father	Employed for wages	106	62.0%	215	62.9%	321	62.6%	0.019*
	Self-employed	28	16.4%	55	16.1%	83	16.2%	
	Military	5	2.9%	32	9.4%	37	7.2%	
	Teacher	13	7.6%	19	5.6%	32	6.2%	
	Government employee	19	11.1%	21	6.1%	40	7.8%	
Educational level of the child mother	Read and write or illiterate	18	10.5%	18	5.3%	36	7.0%	0.024*
	Primary education	13	7.6%	38	11.1%	51	9.9%	
	Preparatory education	22	12.9%	43	12.6%	65	12.7%	
	Secondary education	45	26.3%	124	36.3%	169	32.9%	
	University education or more	73	42.7%	119	34.8%	192	37.4%	
Occupation of the child mother	Employed for wages	25	14.6%	5	1.5%	30	5.8%	0.000*
	A housewife	119	69.6%	283	82.7%	402	78.4%	
	Teacher	7	4.1%	19	5.6%	26	5.1%	
	Government employee	20	11.7%	35	10.2%	55	10.7%	

Table 4: Division of the studied population according to house nature.

Studied Groups		Cases (171)		Controls (342)		Total (513)		Significant Level
	Variables	No	%	No	%	No	%	P. value
House location in Jeddah	North	99	57.9%	162	47.4%	261	50.9%	0.025*
	South	72	42.1%	180	52.6%	252	49.1%	
Type of House	Apartment	144	84.2%	291	85.1%	435	84.8%	0.061
	Villa	22	12.9%	28	8.2%	50	9.7%	
	Popular houses	5	2.9%	23	6.7%	28	5.5%	
Ownership of the house	Owned	39	22.8%	54	15.8%	93	18.1	0.050*
	Rented	132	77.2%	288	84.2%	420	81.9%	
Number of rooms	2	17	9.9%	88	25.7%	105	20.5%	0.000*
	3	66	38.6%	131	38.3%	197	38.4%	
	4	60	35.1%	83	24.3%	143	27.9%	
	5	13	7.6%	29	8.5%	42	8.2%	
	6	15	8.8%	11	3.2%	26	5.1%	

Table 5: Distribution of the studied sample according to child characteristic in his family

Studied Groups		Cases (171)		Controls (342)		Total (513)		Significant Level
	Variables	No	%	No	%	No	%	P. value
The number of family members including the child	3	20	11.7%	78	22.2%8	98	19.1%	0.008*
	4	61	35.7%	89	26.0%	150	29.2%	
	5	48	28.1%	73	21.3%	121	23.6%	
	6	22	12.9%	42	12.3%	64	12.5%	
	7	10	5.8%	29	8.5%	39	7.6%	
	8	10	5.8%	31	9.1%	41	8.0%	
The number of the child's siblings	0	18	10.5%	78	22.8%	96	18.7%	0.000*
	1	32	18.7%	92	26.8%	124	24.2%	
	2	60	35.1%	71	20.8%	131	25.5%	
	3	26	15.2%	37	10.8%	63	12.3%	
	4	20	11.7%	24	7.0%	44	8.6%	
	5	8	4.7%	21	6.1%	29	5.7%	
	6	7	4.1%	19	5.6%	26	5.1%	
The rank of the child in his/her family	1st	51	29.8%	133	38.9%	184	35.9%	0.098
	2nd	61	35.7%	87	25.4%	148	28.8%	
	3rd	30	17.5%	49	14.3%	79	15.4%	
	4th	11	6.4%	31	9.1%	42	8.2%	
	5th	10	5.8%	19	5.6%	29	5.7%	
	6th	8	4.7%	23	6.7%	31	6.0%	

Table 3 illustrate the distribution of the studied sample according to social status. We notice that nearly 2/3 of cases (75.4%) and only 60.8% 0f controls had a middle or high social class, so there was a statistically significant difference (P<0.05). Based on the educational level of the child father, we observe that more the cases 52.6% and only 41.2% of controls have a university education or more, the opposite was on secondary education, we see only 24.0% of cases and 36.5% of controls among secondary education, and all differences have a statistically significant (P<0.05). The difference between cases and controls related to occupation of the father also has a statistical significant (P<0.05) where 9.4% of controls and only 2.9% of cases had military job, while cases occupied teacher and governmental jobs (7.6%&11.1% respectively) more than controls (5.6%&6,1%). Regarding child mother education, 10.5%&26.3%&42.7% of cases were Read and write or illiterate, Secondary education, or University education or more respectively, comparing to 5.3%, 36.3, 34.8 respectively among controls; and all those differences were statistically significant (P<0.05). Furthermore, the child mother occupation was recorded as following 14.6% & 69.6% of cases compared to 1.5% &82.7% of controls were employed for wages and housewife respectively, and all those differences were statistically significant (P<0.05).

Table 4: Division of the studied population according to their house nature. More than half (57.9%) of the cases were from north Jeddah, facing to only 47.4% of the controls; this difference was statistically significant (P<0.05). Most of cases and controls 84.2% &85.1% respectively lived in an apartment, while 12.9% & 2.9% of cases comparing to 8.2% & 6.7% of controls lived in villa & popular house respectively. Previous differences were statistically insignificant (P>0.05). Regarding ownership of the house, we noticed that a higher percentage of cases 22.8% than the controls 15.8% had owned the house, and there is a statistically significant difference between cases and controls (P<0.05). The number of rooms in the house, there were 9.9%& 35.1%& 8.8% of cases compared to 25.7%& 24.3%& 3.2 of controls had 2,4,6 rooms in their house respectively, and those differences were statistically significant (P<0.05).

Table 5: shows the distribution of the studied sample according to child characteristic in his family. Dependent on the number of family members including the child we noticed that more than 2/3 of cases (75.5%) had a family member less than 6, which were 11.7%& 35.7%& 28.1 % respectively of cases had 3, 4 or 5 family members, facing to 22.2%& 26.0% & 21.3% respectively among controls, and all those differences were statistically significant (P<0.05). As regard to number of spilling of the child, we observe

that cases who had no spieling or only one spieling were less than (10.5%& 18.7% respectively) the controls (22.8%& 26.8% respectively), while cases who had 2 or 3 spieling were more than (35.1%& 15.2 respectively) the controls (20.8% & 10.8% respectively), and all those differences were statistically significant (P<0.05). Based on the rank of the child in his or her family, we saw that more than half (29.8%& 35.7% respectively) of the cases were the 1st or the 2nd child to his or her family, contrast to (38.9 & 25.4% respectively) of controls, but those differences were statistically insignificant (P>0.05). Table 6 shows the distribution of studied cases according to a type of the poison; we recorded that 40.9 % children were poisoned by medicines, followed by cleaning agents at 30.4 %, and 28.7 % ingested pesticides and insecticides. Link with the physical form of the poisoning, there was 44.4 % ingested poison in the form of powder, 20.5 % solid and 35.1 % in the way of liquid.

Table 6: Distribution of studied cases according to the type of the poison:

Cases		Total (171)	
	Variables	No	%
Type of the poisoning of the child	Medicine	70	40.9%
	Cleaning agent	52	30.4%
	Pesticides/ insecticides	49	28.7%
Physical forms of the poisoning	Powder	76	44.4%
	Solid	35	20.5%
	Liquid	60	35.1%

Table 7: Distribution of studied cases according to the scenario of the poisoning accident:

Cases		Total (171)	
	Variables	No	%
The time of exposure to poisoning	A.M	94	55%
	P.M	77	45%
The storage place of the poisoned material	Bathroom	85	49.7%
	Bedroom	31	18.1%
	Kitchen	27	15.8%
	Living room	28	16.4%
The accessibility of the storage place of poisoning	Yes	151	88.3%
	No	20	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	118	69%
	Inhalation	19	11.1%
	Ocular	19	11.1%
	Unknown	15	8.8%
Main signs by system	Gastrointestinal tract	86	50.3%
	Central nervous system	50	29.2%
	Cardiovascular system	35	20.5%
The Condition of Patient at the time of arrival to Hospital	Stable	124	72.5%
	Unstable	47	27.5%

Table 8: Distribution of studied cases according to reaction toward the poisoning accident:

Cases		Total (171)	
	Variables	No	%
The person whom children were staying at the time of poisoning and observe it:	Mother	123	72.0%
	Maid	37	21.6%
	Father	11	6.4%
The reaction of the first observer:	I did not know what to do	128	74.9%
	Call the nearest hospital	43	25.1%
The reaction of health institution to the problem	Rabid	145	84.8%
	Slow	26	15.2%
The history of any health education about poisoning before the accident:	Yes	13	7.6%
	No	158	92.4%
The history of the previous poisoning for the other siblings	Yes	14	8.2%
	No	157	91.8%
The child was hyperactive	Yes	34	19.9%
	No	137	80.1%
After the accident of poisoning, the history of taking preventive measures to protect the home from the horrors of what happened:	Yes	140	81.9%
	No	31	18.1%

Table 7 and 8: Illustrates the scenario of the poisoning accident among the affected cases.

We noticed that, in around 55 % of the cases, the exposure occurred during A.M timings and 45 % occasions in P.M. Nearly 50 % children took the toxic from the bathroom, with 18.1 % from the bedroom, and 15.8 % from the kitchen and 16.4% from the living room. In 88.3 % of cases, the poisoning material is accessible to children and place from where the child can easily access the substance. In 71.3 % of cases, the poison stored in its regular bottle; while 28.7 % times the toxic material was stored in the water bottle, Pepsi bottle or any other container.

Unexpectedly, 69% took the venom by mouth, with inhalation and ocular transmission accounted for 11.1 % each. In 72 % of the cases, children were staying with their mothers and 21.6 % with their maids, and 6.4 % with their fathers. 72.5% of child patient was stable at the time of arrival to the hospital, while 27.5% was unstable. 50.3 % of the children showed signs through the gastrointestinal tract, 29.2 % by central nerves system, and 20.5 % through cardiovascular systems. Not surprising, 74.9 % observers did not have any idea what to do with finding that the child has ingested the poison. Regarding the reaction of the health institution towered the child poisoning there was 84.8% of them had a rapid response. There was a history of poisoning occurred for the other siblings 8.2%, and there was only 19.9% of cases had a history of hyperactivity. Also, there was 92.4 % of child families did not have any prior poisoning education with only 7.6 % had information about the previous training of accidental poisoning in a child. After the accident, there were nearly 81.9% of families took a preventive measure, while only 18.1% did not make the precautionary measure.

Table 9: Multivariable conditional logistic regression analysis of potential factors for unintentional poisoning among cases (children under 5 years).

Variable		Sig.	Adjusted mOR	95% C.I.
Age by months		.000	.850	.824 to .877
Number of rooms		.003	.569	.390 to .830
Family members		.000	3.260	1.952 to 5.445
Number of siblings		.049	.724	.524 to .999
District	**North**	.520	.814	.434 to 1.524
	South	-	-	-
Gender	**Male**	.572	1.195	.643 to 2.222
	Female	-	-	-
Nationality	**Saudi**	.068	2.081	.948 to 4.571
	Non-Saudi	-	-	-
Marital status	**Married**	.338	1.344	.733 to 2.465
	Divorced	-	-	-
Education of the father	**Primary education**	.317	1.914	.537 to 6.824
	Preparatory education	.619	.757	.253 to 2.265
	Secondary education	.376	1.416	.656 to 3.059
	University or more	-	-	-
Education of the mother	**Read and write or illiterate**	.097	.304	.074 to 1.240
	Primary education	.220	.490	.156 to 1.534
	Preparatory education	.650	.767	.244 to 2.414
	Secondary education	.241	1.624	.722 to 3.651
	University or more	-	-	-
Social class	**Low**	.757	.887	.417 to 1.891
	Middle	-	-	-
Type of house	**Apartment**	.055	.194	.037 to 2.296
	Villa	-	-	-
Ownership	**Owned**	.520	1.345	.545 to 3.317
	Rented	-	-	-
Rank of child	**1st**	.011	13.638	1.811 to102.680
	2nd	.108	4.268	.728 to 25.029
	3rd	.953	.953	.194 to 4.688
	4th	.645	1.509	.263 to 8.657
	5th	.050	.194	.038 to .999
	6th	-	-	

(C): MULTIVARIATE ANALYSIS

Table 9 represents results of Logistic Regression analysis, which determine the factors independently, associated with under five child poisoning. Analysis appeared that older child had 0.850 times to be cases rather than controls (mOR_{adj}= 0.850, 95% CI 0.824 to 0.877). Similarly, cases were 0.569 times more likely to have many numbers of rooms compared to controls (mOR_{adj} =0.569, 95% CI 390 to 0.830). Large family size was more likely to be cases 3.260 than controls (mOR_{adj} = 3.260, 95% CI 1.952 to 5.445). Child who had larger number of siblings were 0.724 more likely be cases than controls (mOR_{adj} = 0.724, 95% CI 0.524 to .999). Child from the north district had .814 times more likely to be cases compared to controls (mOR_{adj}= .814, 95% CI.434 to 1.524). The male had 1.195 times more likely to be in cases compared to controls (mOR_{adj}= 1.195, 95% CI 0.643 to 2.222). Saudi child had 2.081 times more likely to be cases than in controls (mOR_{adj} = 2.081, 95% CI 0.948 to 4.571). Married mother 1.344 times in cases compared to controls (mOR_{adj} = 1.344, 95% CI 0.733 to

2.465). Fathers who had primary education results cases than in controls 1.914 (mOR_{adj} = 1.914, 95% CI 0.537 to 6.824). Secondary educated mother was 1.624 times more likely in cases than in controls (mOR_{adj} = 1.624, 95% CI 0.722 to 3.651). Similarly, the child was in the low social class had 0.887 times more likely to be among cases compared to controls (mOR_{adj} = 0.887, 95% CI 0.417 to 1.891). The child who lived in an apartment was .194 times more likely to be in cases than controls (mOR_{adj} = 0.194, 95% CI 0.037 to 2.296). The cases that owned their house 1.345 were more lily to me more than more than controls (mOR_{adj} = 1.345, 95% CI .545 to 3.317). The rank of a child in his family was strongly associated with child poisoning. Children who ranked as a 1st baby in his family, had a chance thirteen times as likely to be among cases compared to controls (mOR_{adj} = 13.638, 95% CI 1.811 to 102.680) times more likely to be among cases compared to controls. Similarly, the 2nd children in the ranking were four times more likely to be among cases compared to controls (mOR_{adj} = 4.268, 95% CI 0.728 to 25.029).

DISCUSSION

Poisoning is the fourth leading cause of unintentional injury and a common pediatric emergency in children under 5 years of age (Bronstein AC et al., 2008).[8] In preschool children under 5 years of age, most poisoning cases occur (Franklin RL, et al., 2008).[9]

The present case-control study was not population-based. And there was a difficulty and was not possible to obtain practical information about the venue of poisoning accident, storage practices or management for controls (for whom there was no poison or time of poisoning).

There is a little old analytic epidemiologic study on unintentional under 5 child poisoning have been undertaken worldwide (Brayden RM, et al., 1993 & Aziz BH, et al., 1993 and Paritsis N. et al., 1994) and the results are not in coincidence.[10] The study may be due to methodological weaknesses or differences, and it may reflect the fact that childhood poisoning depends on lifestyle factors and environmental conditions that vary across different countries and communities.

In this study, boys are predominately affected more than girls with a ratio of 2:1. Those are the same ratio in the United Arab Emirates. (In this context, Malangu et al. (2009) found that gender ratios between children in Singapore were 1:1.13.[11] However, Oguche et al. (2007) reported that accidental poisoning evenly distributed between boys and girls.[12] This predominance of males could be due to their natural tendency to be more exploratory, active and restless than their female counterparts. The age of the study group ranged from 0 to 48 months, with the most commonly affected group 13 to 24 months which occupied 40.9 % of cases, while occupied 29.8% of controls, compared to Ahmed B, et al. (2010) study who reported that, the majority of poisoning incidents occurred among children 1 to 2 years of age. Those are because children at this age children become more curious aided by their newly acquired hand skills and mobility.[13]

The results also show that expatriate families have a slightly higher tendency for children getting poisoned from household chemicals as compared to Saudi counterparts. In our study, infants (0 to 12 years old) were the most affected age group of children. Contrary to our findings, the survey by Malangu et al. (2009) instigated that infants are less likely to be affected because of their inability to move around, limited capacity to open medicines and chemical containers, and probably due to more attention paid by the family members, particularly the mother.[11]

In our study, the social class has a significant difference between cases and controls and the 2/3 of the cases had a middle or high social class which not compatible with the past year's studies. These old studies reported that child poisoning has increased according to lower social class.[14] South Wales hospitals studied children aged 1-3 years from 1994 to 2005 results that are affected by evaluating the stability of the age-specific pattern found to increase when analyzed by sex, the reserve of residence, and socioeconomic status. (Petridou E, et al., 1996).[15]

Siddiqui et al. (2008) found that poisoning increased within families with a large number of children.[16] In Athens, childhood poisoning would strongly correlate with the number of children and overcrowding conditions.[17] This finding in our study could be explained by the fact that in Saudi families, children who are an elder to their siblings are often trained to look after their younger counterparts, and moreover, poisoning incidences which occurred in families with a small number of children could attribute to lack of experience in younger parents. In India, the percentage of poisoning is declining with the increased level of education of both parents.[18] Abhilash et al. (2009) accentuated that families of children with accidental poisoning tended to be of a low level of education.[19]

Oral poisoning accounted for the highest proportion of poisoning cases (69.0%), and this could have occurred due to curious nature of children of age 1 to 5 years, as they tend to put everything in their mouth to taste and to know what it is. It also attributed to the careless attitudes of the parents and lack of education in handling such poisons.[12] The results of this study also indicated that gastrointestinal symptoms were the most prevalent (50.3%); health workers need to put more attention in making parents understand that symptoms are important indicators of the type of poison ingested and subsequently the severity of symptoms shows the prognosis of the case. The Logistic Regression analysis revealed significant results about the age group and number of rooms. There has been no significant difference between the North and South of Jeddah city about the occurrence of unintentional poisoning among children 0 to 4 years old.

In our study, 55% of poisoning accidents occurred at morning, which corresponds with what published in Northern Jordan, the incidence of poisoning during the working hours, was 80 % higher than the late afternoon and evening hour.[20] In India, poisoning occurred between 8.00 and 11.00 in the morning, which is the time when the housewives are very busy in their home chores.[21] A definitive pattern of poisoning was determined, with poisoning constituted the total intoxication with prescribed medications being the most common. Those are in line with most studies.[22] Powdered ingestion was the most common cause of poisoning (44.4%) responsible for the admissions, like finding from neighboring countries.[23] Those might explain the fact that children find it attractive to taste colorful powdered substance stored in drinking bottles. This notion would also support the study Kholi.[18]

In the United Arab Emirates, medicines are not commonly dispensed in child-proof containers, although many would be had supplied in blister packs, which offer a certain degree of child resistance; so, it is difficult to assess the danger from lack of child-resistant closure.[24] In a study by Anderson et al. (2016) stated that Caucasian mothers had a higher level of knowledge about

accidental childhood poisoning and its prevention and most of them initiated preventive behavior.[25] In contrast to our population in the present study which recorded 84.8% of them had no history of any health education about poisoning before an accident.

CONCLUSION

The magnitude of accidental poisoning is still underestimated and needs proper recording. The tenderest age was children aged 0 to 12 months. Data revealed significant results about the first and second baby, Saudi, male child, married mother, father had primary education, a mother with secondary education, housewife-mothers, owner house; and large family size.

The poisoning occurred mainly from medicine and powder poisoning. The accident of the poisoning occurred mostly at morning, with oral root. The site of the poisoning was accessible primarily at the bathroom and was storage at a same potentially poisonous substance container. Extreme of poisoning child was staying with their mothers at the time of exposure, and most of these mothers didn't know what to do to the poisoning child. Most families didn't have a history of any health education about poisoning before the accident. Gastrointestinal signs were the most presented signs, and farthest of them were stable when they went to the nearest health institution (hospital). The generality of health institutions was rabid react with the poisoning child. There was no history of the previous poisoning for the other siblings in the child's family. Most of the child hadn't a history of hyperactivity. Before poisoning, most families didn't have a history of any health education about poisoning, but after poisoning, they were taking the preventive measures to protect the home from the horrors of what happened.

RECOMMENDATION

The findings of the study are essential for designing prevention interventions because the majority of these factors are potentially modifiable.

Childhood poisoning can prevent by incorporating proper management of poisonous substances and their appropriate storage, and adequate education of children's parents can markedly decrease the magnitude of the issue and minimize the complications.

Significant the number of children in the family, the less is the occurrence of poisoning. Low level of education was found to significantly associated with increased rate of poisoning.

More attention is required towards dealing with toxic materials at home, as these substances should be placed and stored in places out of reach of children and we must pay close attention that the packaging should be child-resistant. The labels should show the names of the toxic materials, the mode of use, the ingredients, first aid in case of poisoning and antidote. All the above-stated precautions need to take into account, and a constant eye on the young children is the priority. Health education programs should have been aligned with educating the public (especially the mothers) how to prevent poisoning and to change the toxic storage habits.

So, Preventive interventions for unintentional poisoning of under 5 years children have many dimensions as:

1. Accidental poisoning is a condition that could prevent when structured health education programs are being placed to teach the public on safe practice of storing.
2. Powdered substances were the most frequent causes of toxicities in children. There is a need to set legislation in place to obligate the companies not to use attractive bottles that also resemble that of soft drinks.
3. Law should be considered into practice for drug manufacturers to use containers, which are child-resistant and child-resistant packing for all of their medicinal products.
4. There is a need to install and establish 24-hour poison centers, which are well equipped with a proper guideline to the physicians and healthcare staff.
5. There is also a need to design effective management plans and life-saving measures like when to give the child ventilator support, dialysis, and other lifesaving procedures.
6. Poisson modeling across the social classes was unlikely to be arisen by chance alone which showed that the trend in decline in death rates.
7. This pattern persisted over time; new cases had the highest rates of hospitalization due to unintentional poisoning.
8. Poisoning pattern always had a relationship related to sex, the reserve of residence, and socioeconomic status.
9. The real extent of this problem would not thoroughly have investigated yet. Therefore, it is recommended a large-scale randomized control trial in the city of Jeddah which should be community-based research to reveal the actual dimensions of this health threat.

ACKNOWLEDGEMENT

We would like to pay special gratitude to God for support in every aspect of life. After that, we want to appreciate efforts and encouragement provided by our families.

Furthermore, we would like to thanks Joint Program of Family and Community Medicine for their ethical approval and the parents of children for their participation in the study.

REFERENCES

1. Lam L. Childhood and adolescence poisoning in NSW, Australia: an analysis of age, sex, geographic, and poison types. Inj Prev [Internet]. 2003 [cited 2016 Oct 21]; Available from: http://injuryprevention.bmj.com/content/9/4/338.short

2. World Health Organization, The World Bank. World Report on Disability 2011. American journal of physical medicine rehabilitation Association of Academic Physiatrists. 2011.

3. WHO. The Injury Chart Book. Int Classif. 2002;

4. Nonfatal, unintentional medication exposures among young children--US, 2001-2003. Ann Pharmacother. 2006;

5. World Health Organization, Peden M. World report on child injury prevention [Internet]. 2008 [cited 2016 Oct 21]. Available from:https://books.google.com/books?hl=en&lr=&id=UeXwoNh8sbwC&oi=fnd&pg=PR7&dq=Peden+MM.+World+report+on+child+injury+prevention.+World+Health+Organization%3B+2008&ots=hG5zUNdvXL&sig=yoyrN1CVPs7t8iFoxFN5h7b231Y

6. O'Brien C. Pediatric Poisoning Fatalities From 1972 Through 2005. Bethesda, MD US Consum Prod Saf. 2008;

7. Morrongiello BA, Corbett M, Brison RJ. Identifying predictors of medically-attended injuries to young children: Do child or parent behavioural attributes matter? Inj Prev. 2009;

8. Bronstein AC, Spyker DA, Cantilena LR, Green JL, Rumack BH, Giffin SL. 2008 Annual report of the American association of poison control centers' national poison data system (NPDS): 26th

annual report AAPCC 2009 annual report of the NPDS. Clinical Toxicology. 2009.
9. Franklin RL, Rodgers GB. Unintentional Child Poisonings Treated in United States Hospital Emergency Departments: National Estimates of Incident Cases, Population-Based Poisoning Rates, and Product Involvement. Pediatrics. 2008;
10. Brayden RM, MacLean WE et al. Behavioral Antecedents of Pediatric Poisonings. Clin Pediatr (Phila). 1993;
11. Malangu N, Ogunbanjo GA. A profile of acute poisoning at selected hospitals in South Africa A profile of acute poisoning at selected hospitals in South Africa. South African J Epidemiol Infect. 2017;8782(January):13–6.
12. Oguche S, Bukbuk DN, Watila IM. Pattern of hospital admissions of children with poisoning in the Sudano-Sahelian North eastern Nigeria. Niger J Clin Pract. 2007;10(2):111–5.
13. Ahmed B, Fatmi Z, Siddiqui A. Predictors of unintentional poisoning among children under 5 years of age in Karachi: a matched case–control study. Injury [Internet]. 2011 [cited 2016 Oct 21]; http://injuryprevention.bmj.com/content/17/1/27.short
14. Roberts I. Cause specific social class mortality differentials for child injury and poisoning in England and Wales. Epidemiol Commun Heal [Internet]. 1997 [cited 2017 Nov 14];51(7):334–5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1060483/pdf/jepicomh00177-0120.pdf
15. Petridou E, Kouri N, Polychronopoulou A, Siafas K, Stoikidou M, Trichopoulos D. Risk factors for childhood poisoning: A case-control study in Greece. Inj Prev. 1996;
16. E.U. S, J.A. R, F. N, S.J. K. Factors associated with hydrocarbon ingestion in children. J Pak Med Assoc. 2008;
17. Koliou M, Ioannou C, Andreou K, Petridou A, Soteriades ES. The epidemiology of childhood poisonings in Cyprus. Eur J Pediatr. 2010; 169(7):833–8.
18. Kohli U, Kuttiat VS, Lodha R, Kabra SK. Profile of childhood poisoning at a tertiary care centre in north India. Indian J Pediatr. 2008; 75(8):791–4.
19. Abhilash PC, Singh N. Pesticide use and application: An Indian scenario. Journal of Hazardous Materials. 2009; 165, 1–12.
20. Haghighat M, Moravej H, Moatamedi M. Epidemiology of Pediatric Acute Poisoning in Southern Iran: A Hospital-Based Study. Bull Emerg trauma. 2013;1(1):28–33.
21. Kumar S, Patil R, Dad GL. A retrospective study of poisoning cases at a tertiary care teaching hospital of southern {Rajasthan}. Medico-Legal Updat [Internet]. 2016;16(2):235–9. Available from: http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L611803847
22. Sg S, Avabratha S, Aby K, Varghese D, Rai S. Sowmya SG, et al. Poisoning in children Poisoning In Children: Experience At A Tertiary Care Hospital In Mangalore. Int J Med Sci Public Heal. 2014.
23. Hanssens Y, Deleu D, Taqi A. Etiologic and demographic characteristics of poisoning: A prospective hospital-based study in Oman. J Toxicol - Clin Toxicol. 2001;
24. Al Hazmi AM. Patterns of accidental poisoning in children in Jeddah, Saudi Arabia. Ann Saudi Med. 1998;
25. Anderson M, Hawkins L, Eddleston M, Thompson JP, Vale JA, Thomas SHL. Severe and fatal pharmaceutical poisoning in young children in the UK. Arch Dis Child [Internet]. 2016;101(7):653–6. http://adc.bmj.com/lookup/doi/10.1136/archdischild-2015-309921

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Ahlam Hamid Natto, Iman Wahby, A.P. Adel Ibrahim. Risk Factors of Household Chemical Unintentional Poisoning Among Children (0-4) Years Old Reported at the Public Health Administration In Jeddah, Saudi Arabia From 2014 to 2016: A Case-Control Study. Int J Med Res Prof. 2019 Mar; 5(2):34-42. DOI:10.21276/ijmrp.2019.5.2.009