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 Poisoning Among Children (0-4) Years Old Reported at the Public Health Administration in Jeddah From 2014 to 2016: A Case-Control Study

Ahlam Hamid Natto[1*], Iman Wahby[2], A.P. Iman Mohmad Wahby Salem[3]

[1*]Public Health Specialist, East Jeddah Hospital, Jeddah, KSA.
[2]Community Medicine Consultant, Joint Program of Family and Community Medicine, Jeddah, KSA.
[3]MBBS, MSC, PhD in Community Medicine, Associate Professor of Community Medicine, King Abdul Aaziz University, Faculty of Medicine, Family and Community Medicine, Jeddah, KSA; Al Azhar University, Faculty of Medicine, Egypt.

ABSTRACT

Background: Poisoning is an injury caused by a xenobiotic or a substa6nce 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 aim of the present study is 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 was conducted in the Institute, State during a period of 1 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 was arranged in a tabulated form and analysed using SPSS software.

Results: The age of the study group for the case and control ranged from 0 months to 48 months, with the most commonly affected group 0 to 12 months was 36.1 %. There were 162 (47.4%) controls and 99 (57.9%) cases that belonged to North. There were 291 (56.7%) controls and 144 (28.1%) cases. There were 28 (5.5%) controls and 22 (4.3%) cases that resided in Villa. In 72 % of the cases, children were staying with their mothers and 21.6 % with their maids, and 6.4 % with their fathers. In 88.3 % of cases, the poisoning material is accessible to children and place from where the child can easily access the substance.

Conclusion: The tenderest age was children aged 0 to 12 months. Oral poisoning accounted for highest incidences. More significant the number of children in the family, the less is the occurrence of poisoning.

Keywords: Childhood, Poisoning, Xenobiotic.

***Correspondence to:**

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

Article History:

Received: 16-10-2017, **Revised:** 03-11-2017, **Accepted:** 28-11-2017

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2017.3.6.116	

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. Worldwide, Peden et al., (2008), found that children under five years of age account for about 15% of unintentional poisoning-related deaths[5], and about 23% of DALYs lost globally is due to poisoning.[6] O'Brien, (2008) showed that the low and middle-income countries have higher mortality rates for unintentional poisoning among children at this

age.[7] Peden et al., (2010) in the EMRO region, recorded that, the mortality rates due to poisoning are 1.6 per 100,000 children.[8] 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.[9] The aim of the present study is 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 was conducted in the in Jeddah city during a period of 1 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. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from all. At the age 2014, cases of poisoning were (116) 2015 were (114) and 2016 (143). Children aged between 0-4 years, permanently residing in Jeddah and had poisoning as reported incident were included in the study. Subjects with vague diagnosis of poisoning, incomplete records regarding age, time and refusal to converse with the researcher were excluded from the study. Per last statistical report (2016) from the public health administration centre in Jeddah, the city divided into eight health sectors, so we chose one from each sector. The controls had matched with age and gender with cases. These eight centers enrolled from children attending the vaccination and well-baby clinics at selected PHC centers in Jeddah city during the year of the study. The control children were selected by the systematic random sample from the choosey centers. The researcher had developed and validated data collection forms (questionnaire) which pretested. It was developed from similar literature reviews (risk factors) and completed from recorded data files from the center of primary health care, administrated of public health (demographic data). 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. Poisoning substance (the cause, physical form, place) etc were also recorded. Type and mode of exposure, outcome variable, environmental domain and type of management were also recorded. All the data was arranged in a tabulated form and analysed using SPSS software.

Table 1: Distribution of data according to age by month from 0-48 to 2016 total case and control

Socio-Demographic Characteristics:		Studied Sample				Significant Tests
		Cases (342)		Controls (171)		
		No.	%	No.	%	
Age Groups (years)	0-12 months (1 year)	185	36.1%	185	36.1%	
	13-24 months (2 years)	172	33.5%	172	33.5%	
	25-36 months (3 years)	117	22.8%	117	22.8%	
	37-48 months (4 years)	39	7.6%	39	7.6%	
Mean ± S.D		25.39± 18.3				
Range		71				
Gender	Male	107	62.6%	192	56.1%	
	Female	64	37.4%	150	43.9%	0.164*
Nationality	Saudi	90	52.6%	134	39.2%	
	Non-Saudi	81	47.4%	208	60.8%	0.004*
Marital status	Married	68	39.8%	171	50%	
	Divorced	103	60.2%	171	50%	.018*

Table 2: Division of the subjects according to district

Crosstab			Case Control Studies		Total
			Control	Case	
District by division	North	Count	162	99	261
		% within Case Control Studies	47.4%	57.9%	50.9%
		% of Total	31.6%	19.3%	50.9%
	South	Count	180	72	252
		% within Case Control Studies	52.6%	42.1%	49.1%
		% of Total	35.1%	14.0%	49.1%
Total		Count	342	171	513
		% within Case Control Studies	100.0%	100.0%	100.0%
		% of Total	66.7%	33.3%	100.0%
Pearson Chi-Square		5.054[a]	0.025 Asymptotic Significance (2-sided)		

Table 3: Distribution of subjects according to apartment

Crosstab			Case Control Studies		Total	p Value
			Control	Case		
Type of House	Apartment	Count	291	144	435	
		% within Case Control Studies	85.1%	84.2%	84.8%	
		% of Total	56.7%	28.1%	84.8%	
	Villa	Count	28	22	50	
		% within Case Control Studies	8.2%	12.9%	9.7%	0.061
		% of Total	5.5%	4.3%	9.7%	
	Popular houses	Count	23	5	28	
		% within Case Control Studies	6.7%	2.9%	5.5%	
		% of Total	4.5%	1.0%	5.5%	
Total		Count	342	171	513	
		% within Case Control Studies	100.0%	100.0%	100.0%	
		% of Total	66.7%	33.3%	100.0%	
Pearson Chi-Square		5.588[a]	0.061 Asymptotic Significance (2-sided)			

Table 4: Distribution of subjects according to ownership of house

Crosstab			Case Control Studies		Total
			Control	Case	
Ownership of the house	Owned	Count	54	39	93
		% within Case Control Studies	15.8%	22.8%	18.1%
		% of Total	10.5%	7.6%	18.1%
	Rented	Count	288	132	420
		% within Case Control Studies	84.2%	77.2%	81.9%
		% of Total	56.1%	25.7%	81.9%
Total		Count	342	171	513
		% within Case Control Studies	100.0%	100.0%	100.0%
		% of Total	66.7%	33.3%	100.0%
Pearson Chi-Square		3.782[a]	0.052 Asymptotic Significance (2-sided)		

RESULTS

Table 1 shows the distribution according to age by month from 0-48 to 2016 total case and control. The age of the study group for the case and control ranged from 0 months to 48 months, with the most commonly affected group 0 to 12 months was 36.1 %. Also, according to the data retrieved in 2016, 33.5 % children were 13 to 24 months at the time of poisoning. Children between 37 to 48 years were (7.6%). Sex distribution found in cases of male children was 62.6 % and Females which were 37.4% which was significant. The results show the relationship among the children ingested poison 52.6% belonged to Saudi families for the case, and 60.8% were non-Saudi control. The proportion of children of cases who got poisoned were 60.2%% from married parents as compared to control divorced parent which signified to only 50 %. Table 2 shows the division of subjects according to district. There were 162 (47.4%) controls and 99 (57.9%) cases that belonged to North. A total of 50.9% subjects who belonged to northern district. There were 180 (52.6%) controls and 72 (42.1%) cases that belonged to southern district. On applying chi square test the p value came out to be .025. A total of 252 subjects belonged to southern district. Table 3 shows the distribution of subjects according to apartment. There were 291 (56.7%) controls and 144 (28.1%) cases. There were 28 (5.5%) controls and 22 (4.3%) cases that resided in Villa. A total of 50 subjects were residents of villa. There were 28 subjects who resided in popular houses. Amongst them there were 6.7 % controls and 2.9 % cases. On applying chi square test, an asymptomatic significance of .061 was obtained. Table 4 shows the distribution of subjects according to ownership of house. A total of 93 houses were owned. Out of these 15.8% (n=54) were controls and 22.8% (n=39) cases. A total of 420 subjects were residents of rented apartments. Amongst them 56.1% were controls and 25.7% were cases. On applying chi square test p value of 0.52 was obtained.

Table 5 shows distribution of data according to poisoning In 72 % of the cases, children were staying with their mothers and 21.6 % with their maids, and 6.4 % with their fathers. In 88.3 % of cases, the poisoning material is accessible to children and place from where the child can easily access the substance. In most of the times, 71 % of occasions, mothers were the first observers followed by 14 and 15 % by parents and maids, respectively. In around 55 % of the cases, the exposure occurred during A.M timings and 45 % occasions in P.M. Not surprising, 73.7 % observers did not have any idea what to do with finding that the child has ingested the poison. Only 21.1% of them immediately called the nearest hospital, 1.2% reacted by giving milk or try to make the child vomit. 41 % children were poisoned by medicines, followed by cleaning agents at 31 % and 29 % ingested pesticides and insecticides. 44.4 % ingested poison in the form of powder, 21 % solid and 35 % in the way of liquid. Unexpectedly, 69 % took the venom by mouth, with inhalation and ocular transmission accounted for 11.1 % each. 50 % children took the toxic from the

bathroom, with 18 % from the bedroom, and 16 % from the kitchen and the living room. There was a history of poisoning occurred for the other siblings4.1%. The condition of Patient at the time of arrival to Hospital was Stable 72.5% and Unstable was 27.5%. On 85 % of the occasion, the parents were satisfied with the care service they received at the hospital, while only 15.2 % were dissatisfied. 49 % of the children showed signs and symptoms through the gastrointestinal tract, 32.7 % by central nerves system, and 18.4 % through cardiovascular systems. In 72 % cases, the poison stored in its regular bottle; while 28.65 % times the toxic material was stored in the water bottle, Pepsi bottle or any other container. 92.4 % did not have any prior poisoning education with only 7.6 % had information about the previous training of accidental poisoning in a child. 82 % took preventive measure after the incidence, 18% did not make the precautionary measure. Table 6 and 7 represents results of Logistic Regression analysis. Data revealed significant results with regard to age group and number of rooms.

Table 5: Distribution of data Distribution of data according to poisoning

Poisoning Characteristics		Cases (342)	
		No.	%
With whom children were staying at the time of poisoning?	Mother	123	71.9%
	Father	11	6.4%
	Maid	37	21.6%
Is the place for poisoning accessible?	Yes	151	88.3%
	No	20	11.7%
Who was the first observer of the occurrence of poisoning?	Mother	121	70.9%
	Maid	26	15.2%
	Parents	24	14%
What time of exposure to poisoning?	A.M	94	55%
	P.M	77	45%
How did the first observer react?	Administer first aid	3	1.8%
	Call the nearest hospital	36	21.1%
	I did not know what to do	126	73.7%
	Milk	2	1.2%
	Try to make the child vomit	2	1.2%
What caused the poisoning of the child?	Medicine	70	40.9%
	Cleaning agent	52	30.4%
	Pesticides/ insecticides	49	28.7%
The physical form of poisoning?	Powder	76	44.4%
	Solid	35	20.5%
	Liquid	60	35.1%
Mode of exposure to poisoning?	Oral	118	69%
	Inhalation	19	11.1%
	Ocular	19	11.1%
	unknown	15	8.8%
Where did the child get the poisoned material?	Kitchen	25	14.6%
	Bathroom	85	49.7%
	Bedroom	31	18.1%
	Living room	28	16.4%
	Others	2	1.2%
Main signs by system	Gastrointestinal tract	24	49.0%
	Cardiovascular system	9	18.4%
	central nervous system	16	32.7%
Where the potentially poisonous substance stored?	A different container like (water bottle, Pepsi bottle....	49	28.7%
	The same potentially poisonous substance container	122	71.3%
Was there any history of poisoning occurred for the other siblings?	Yes	1.4	4.1%
	No	32	95.9%
Condition of Patient at the time of arrival to Hospital	Stable	124	72.5%
	Unstable	47	27.5%
Did the health institution react rapidly to your problems?	Yes	145	84.8%
	No	26	15.2%
Did you have any health education of poisoning before?	Yes	13	7.6%
	No	158	92.4%
Are you now taking preventive measures to protect your home from the horrors of what happened?	Yes	140	81.9%
	No	31	18.1%

Table 6: Model Summary of Logistic Regression analysis

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	**600.364[a]**	**.098**	**.136**

Table 7: Coefficients for Logistic Regression analysis

Variables in the Equation							
		B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Step 1[a]	**Age Group**	.506	.106	22.876	1	.000*	1.659
	District By Division	-.368	.205	3.220	1	.073	.692
	Marital Status	.360	.200	3.239	1	.072	1.434
	Nationality	.001	.237	.000	1	.998	1.001
	Social Class	.391	.239	2.678	1	.102	1.478
	Number Of Rooms	.267	.109	6.033	1	.014*	1.306

DISCUSSION

Poison is possible because children under the age of 5 are naturally curious and their dependence on the adults for their lives is one of the reasons for their accidental poisoning. Childhood poisoning can prevent by incorporating a 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.[10] Oral poisoning accounted for the highest proportion of poisoning cases, 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.[11] The results of this study also indicated that gastrointestinal symptoms were the most prevalent; 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 also shows the prognosis of the case. The Logistic Regression analysis revealed significant results with regard to 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 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.[12] In this context, Malangu et al. (2009) found that gender ratios between children in Singapore were 1:1.[13] However, Oguche et al. (2007) reported that accidental poisoning evenly distributed between boys and girls.[11] 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 0 to 12 months. Those are because children at this age children become more curious aided by their newly acquired hand skills and mobility. 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 study 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.[13]

Siddiqui et al. (2008) found that poisoning increased within families with a large number of children.[14] In Athens, childhood poisoning would strongly correlate with the number of children and overcrowding conditions.[15] This finding in our study could 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.[16] Abhilash et al. (2009) accentuated that families of children with accidental poisoning tended to be of a low level of education.[17]

In Northern Jordan, the incidence of poisoning during the working hours, was 80 % higher than the late afternoon and evening hour.[18] 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.[19] 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.[20] Powdered ingestion was the most common cause of poisoning responsible for the admissions, similar to finding from neighboring countries.[12] 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.[16] 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. 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.[21] For the past years, child poisoning has increased according to lower social class.[22] 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.[23]

CONCLUSION

The magnitude of accidental poisoning is still underestimated and needs proper recording. The tenderest age was children aged 0 to 12 months. Oral poisoning accounted for highest incidences. More

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.

ACKNOWLEDGEMENT

Initially, I would like to pay special gratitude to god for his support in every aspect of life. After that, I want to appreciate efforts and encouragement provided by my parents, Hamid Natto and Aisha Natto, My family believed in me I couldn't do it without them.

I would like to thanks my supervisors for their continuous supervision assistance whenever required. Without their support, it was impossible for me to conduct this research. Furthermore, I would like to thanks Joint Program of Family and Community Medicine for their ethical approval and the parents of children for their participation in research.

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];
2. Organization WHO. poisoning prevention and management. 2011; http://www.who.int/ipcs/poisons/
3. Injuries WHO. The injury chart book: A graphical overview of the global burden of injuries [Internet]. 2002 [cited 2016 Oct 21].
4. Control C for D. Nonfatal, unintentional medication exposures among young children--United States, 2001-2003. MMWR Morb [Internet]. 2006
5. World Health Organization, Peden M. World report on child injury prevention [Internet]. 2008 [cited 2016 Oct 21].
6. Hyder A, Wali S, Fishman S, Schenk E. The burden of unintentional injuries among the under-five population in South Asia. Acta Paediatr [Internet]. 2008
7. O'Brien C. Pediatric Poisoning Fatalities From 1972 Through 2005. Bethesda, MD US Consum Prod Saf [Internet]. 2008
8. Peden MM OKO-SJ. World report on child injury prevention.World Health Organization. 2010.
9. Morrongiello B, Corbett M, Brison R. Identifying predictors of medically-attended injuries to young children: do child or parent behavioural attributes matter? Inj Prev [Internet]. 2009
10. Hazmi A Al. Patterns of accidental poisoning in children in Jeddah, Saudi Arabia. Ann Saudi Med [Internet]. 1998.
11. 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.
12. Hanssens Y, Deleu D, Taqi a. Etiologic and demographic characteristics of poisoning: a prospective hospital-based study in Oman. J Toxicol Clin Toxicol. 2001;39(4):371–80.
13. 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.
14. Siddiqui EU, Razzak JA, Naz F, Khan SJ. Factors associated with hydrocarbon ingestion in children. J Pak Med Assoc. 2008;58(11):608–12.
15. 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.
16. 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.
17. Abhilash PC, Singh N. Pesticide use and application: An Indian scenario. Vol. 165, Journal of Hazardous Materials. 2009. p. 1–12.
18. 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.
19. 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.
20. 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 [Internet]. 2014 [cited 2017 Nov 1];3(11).
21. 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.
22. 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.
23. Schmertmann M, Williamson A, Black D. Stable age pattern supports role of development in unintentional childhood poisoning. Inj Prev [Internet]. 2008 Feb [cited 2017 Nov 14];14(1):30–3.

Source of Support: Nil.

Conflict of Interest: None Declared.

Cite this article as: Ahlam Hamid Natto, Iman Wahby, A.P. Iman Mohmad Wahby Salem. Risk Factors of Household Chemical Poisoning Among Children (0-4) Years Old Reported at the Public Health Administration in Jeddah From 2014 to 2016: A Case-Control Study. Int J Med Res Prof. 2017 Nov; 3(6):516-21. DOI:10.21276/ijmrp.2017.3.6.116