Preliminary Study on Assessment of Lead Exposure in Thai Children Aged between 3-7 Years Old Who Live in Umphang District, Tak Province

Naiyana Neesanan MD*, Rachada Kasemsup MD*,
Suntree Ratanachuaeg MD*, Puangporn Kojaranjit RN**,
Kim Sakulnoom RN**, Chantana Padungtod MD***

** Social Pediatrics Unit, Department of Pediatrics, Queen Sirikit National Institute of Child Health, College of Medicine, Rangsit University, Bangkok, Thailand*
*** Social Pediatrics nurse, Queen Sirikit National Institute of Child Health, Bangkok, Thailand*
**** Section of Occupational and Environment Diseases, Centers of Disease Control, Ministry of Public Health, Nonthaburi, Thailand*

Background: *Centers of Disease Control of the United States of America (CDC) informs Ministry of Public Health, Thailand that up to13% of Burmese refugee children who are transferred to the United States of America during 2007-2009 have elevated blood lead levels (EBLL, Blood Lead Level $\geq$ 10 µg/dl). These are children from a number of refugee camps in Tak Province; two camps are near Umphang but other camps are not. In June 2008, CDC, the result of investigation of Centers for Disease Control/Thailand Ministry of Public Health Collaboration (CDC/TUC) and International Organization for Migration, Thailand indicates that 33 of 64 children aged 6 months to 15 years (5.1%) who live in Mae La, Umpiem and Nupo camps have elevated blood lead level. However, no study on how Thai children who live nearby those camps are exposed to lead. Subsequently, Queen Sirikit National Institute of Child Health, Bangkok, Thailand contacts relevant organizations in Tak Province in order to investigate lead exposure and evaluate health status of Thai children who live close to Burmese refugee camps.*

Objective: *1) Evaluation of lead exposure of Thai children who live nearby Burmese refugee camps; 2) Assessment of risk factors on lead exposure of the children as mentioned above.*

Material and Method: *The present study adopts a retrospective study based on information gathered from health assessment on 213 Thai children aged between 3-7 years old who live nearby Burmese refugee camps. The health assessment was conducted from April 30th, 2010 to May 5th, 2010. The information is from 3 sources. The first source is from blood sampling in order to assess lead level and ferritin level. The next source is from interview of persons who provide primary care in order to identify risk factors on lead exposure of target children. The last source is from physical examination and developmental assessment conducted by pediatricians and special nurses for child development in order to identify health and developmental problems.*

Results: *The population of the present study was 213 of Thai children are 3-7 years old, average age is 54.54 $\pm$ 12.41 months-old. The average blood lead level is 7.71 $\pm$ 4.62 µg/dl (range = 3-25 µg/dl). Elevated blood lead levels of all populations show that 57 children (26%) have blood lead level at 10 µg/dl or more. Analysis of odds by controlling all risk factors (adjusted OR) that effect on blood lead level ($\geq$ 10 µg/dl) indicates that only gender and source of drinking water are risk factors. To clarify, male children would have 2.8 times higher risk than female children. Children who drink water from tap and canal have 15 times and 72 times, respectively, higher risk than children drinking from bottle water.*

Conclusion: *The result of the present study shows that 1 of 4 of Thai children at Umphang district, Tak Province who lived near Burmese refugee camps aged between 3-7 years old have blood lead level higher than concerning level. Thus, it is necessary to identify risk factors on lead exposure and policy of blood lead screening in some areas in Thailand.*

Keywords: *Lead exposure, Lead, Risk assessment, Children, Umphang District*

J Med Assoc Thai 2011; 94 (Suppl. 3): S113-S120
Full text. e-Journal: *http://www.mat.or.th/journal*

Correspondence to: *Neesanan N, Department of Pediatrics, Queen Sirikit National Institute of Child Health, Rajavithi Road, Ratchathewi, Bangkok 10400, Thailand.*
Phone: 0-2354-8333
Email: nongbhu@yahoo.com

Lead is heavy metal which is able to accumulate in the body without showing any symptoms. However, it has an impact on brain, cognition and health, especially on the developing brain of children. If brain gets lead toxicity, it has never recovered as normal functions. Many studies suggest that even if the blood lead level is less than CDC's blood lead level of concern, this could have an impact on children such ways as low cognitive intelligence, slow learning and behavioral problems[1-5].

Centers of Disease Control of the United States of America (CDC) informed the Ministry of Public Health, Thailand that 13% of Burmese refugee children who were transferred to the United States of America during 2007-2009 had elevated blood lead levels (EBLL, Blood Lead Level $\geq$ 10 μg/dl). Most of them were from Umphang, Tak Province. In June 2009, CDC, the result of investigation of Centers for Disease Control/ Thailand Ministry of Public Health Collaboration (CDC/ TUC) and International Organization for Migration[6], Thailand indicated that 33 of 645 children (5.1%) who live in Mae La, Umpiem and Nupo camps have elevated blood lead level. However, there is no study on how Thai children who live nearby those camps about exposure to lead. Subsequently, Queen Sirikit National Institute of Child Health, Bangkok co-ordinates with relevant organizations in Tak Province in order to investigate lead exposure and evaluate health status of Thai children who live close to Burmese refugee camps. The result of the present study will be used for developing child health supervision guidelines. This is to ensure that the guidelines are appropriate to local health problems.

Objective

1) Evaluation of lead exposure of Thai children who live nearby Burmese refugee camps.

2) Assessment of risk factors on lead exposure of the children as mentioned above.

Material and Method

The health care team from QSNICH underwent health assessment in 213 Thai children aged 3-7 years old who live nearby Burmese refugee camps between 30th April-5th May 2010. This child health assessment included 3 parts. Part 1 is to interview the primary care-takers in order to identify risk factors on lead exposure; general information, environment, diet, source of lead exposure. Part 2 is do the physical examination and developmental assessment. The third part is to obtain blood from these children in order to assess lead and ferritin levels. An analysis of blood lead level is based on the atomic absorption method conducted by the Section of Occupational and Environment Diseases, Centers of Disease Control, Ministry of Public Health, Thailand. An analysis of ferritin levels is conducted by laboratory officers at Queen Sirikit National Institute of Child Health, Thailand.

Definition used in the present study

Elevated Blood Lead Level (EBLL) in the present study means the blood lead level in children is 10 ug/dl or more which requires actions for prevention[5,7,8].

Children who have iron deficient erythro-poiesis stage means the ferritin level is less than 10 ug/ dl[10].

Information from interview is concerned with general information, environmental, dietary, source of lead exposure. The language which has been used for interviewing is Thai and local languages. Consent will be provided from a guardian before interviewing and blood sampling.

Statistical analysis

SPSS version 12 is used for statistic calculation. The general characteristics, environmental factors and blood lead level are described by percentage, minimum-maximum and mean $\pm$ SD. Mean of blood lead level and study variables are compared by t-test. The relationship between elevated blood lead level (BLL $\geq$ 10 ug/dl) and multiple variables is calculated by linear multi-regression analysis to obtain odd ratios and 95% confidence intervals. The statistically significant is p-values $\leq$ 0.05.

Results

Population of the present study is 213 of Thai children 3-7 years old, average age is 54.54 $\pm$ 12.41 months-old. The average blood lead level is 7.71 $\pm$ 4.62 μg/dl (minimum-maximum = 3-25 μg/dl). Elevated blood lead level of all populations are described in Table 1 which shows that 72 children (26%) have blood lead level at 10 μg/dl or more. Moreover, 24 children (11.26%) have iron deficient erythropoiesis (serum ferritin < 10 ug/dl), but only one child (4.17%) has EBLL. Table 2 shows statistical significant differences in blood lead level among variables such as male sex, under-nutrition, history of breast feeding, source of food, source of drinking water and consumption, using chargeable battery in the house, children living outside the municipality.

Table 1. Demographic characteristics and risk factors for lead exposure among young Thai children in Umphang with and without elevated blood lead levels. (n = 213 children)

variable	blood lead level ≥10 ug/dl (n = 57)		blood lead level < 10 ug/dl (n = 156)	
	number	percent	number	percent
Gender				
Male	35	35.0	65	65.0
Female	22	19.5	91	80.5
Age (Year)				
3	3	25.0	9	75.0
4	12	22.2	42	77.8
5	16	17.8	74	82.2
6	17	47.2	19	52.8
> 6	9	42.9	12	57.1
Nutrition Status				
Weight (n = 209)				
Normal Weight for Age	36	22.0	128	78.0
Under Weight for Age	21	52.5	19	47.5
Over Weight for Age	0	0.0	5	100.0
Height (n = 208)				
Normal Height for Age	35	21.2	130	78.8
Under Height for Age	22	50.0	22	50.0
Head Circumference (n = 193)				
Normal HC for Age	46	24.9	139	75.1
Under HC for Age	2	25.0	6	75.0
Ferritin level				
< 10 ug/dl	1	4.2	23	95.8
≥ 10 ug/dl	56	29.6	133	70.4
Developmental Assessment (n = 206)				
Normal	18	16.1	94	83.9
Suspected	22	32.8	45	67.2
Unable to evaluate	16	59.3	11	40.7
History of breast feeding (n = 206)				
Yes	54	28.1	138	71.9
No	2	14.3	12	85.7
Living Location (n = 211)				
Outside Municipality	39	30.7	88	69.3
Inside Municipality	17	20.2	67	79.8
Hand Washing before Meals (n = 206)				
No	14	36.8	24	63.2
Yes	42	25.0	126	75.0
Source of Regular Food (n = 208)				
Home Made	55	28.8	136	71.2
Others	1	5.9	16	94.1
Source of Drinking Water (n = 209)				
Tap Water	37	39.0	58	61.1
Bottle Water	2	2.9	66	97.1
Canal Water	9	60.0	6	40.0
Underground Water	0	0.0	6	100.0
Rain Water	0	0.0	5	100.0
Multi Sources of Water	8	40.0	12	60.0

Table 1. Cont

variable	blood lead level ≥10 ug/dl (n = 57)		blood lead level < 10 ug/dl (n = 156)	
	number	percent	number	percent
Preparation for Drinking Water (n = 207)				
No action taken	33	26.8	88	72.7
Boiling	19	27.3	49	72.1
Via Filter Equipment	1	7.7	12	92.3
Via Filter Paper	3	60.0	2	40.0
Sources of Water for taking a bath (n = 208)				
Tap Water	34	20.6	131	79.4
Multi Sources	9	45.0	11	55.0
Canal Water	12	63.2	7	36.8
Underground Water	1	25.0	3	75.0
Use of Rechargeable Battery in House (n = 209)				
No	25	19.8	101	80.2
Yes	31	37.4	52	62.7
Providing Garage Services/Recharge Motor Vehicle Battery at House (n = 209)				
No	50	25.8	144	74.2
Yes	6	40.0	9	60.0

Discussion

In Thailand, several studies, which reported average blood lead level of Thai children[11-13], is less than 10 ug/dl a level of concern as specified by CDC. From the study by Ruangkanchanasetr S et al[11,12], it was found that the mean of blood level was increasing in accordance with age. With regard to children at kindergarten level, the study by Ruangkanchanasetr S, et al indicates that mean of BLL was 6.74 $\pm$ 2.02 µg/dl, males had higher lead levels than females and only 10% of these children are EBLL. The authors' findings show that mean of BLL is 7.71 $\pm$ 4.62 µg/dl and males have higher average blood lead level than females. It can be seen that the authors' findings are consistent with the afore-mentioned study. Conversely, the authors' findings on EBLL are 26% of all populations, which is obviously different from Ruangkanchanasetr's study.

The study by Chomchai et al on children with an average age 1.66 $\pm$ 1.39 years old in 4 communities found that the overall prevalence of EBLL ($\geq$ 10 ug/dl) was 8.1% and the risk factor of elevated blood lead levels was the presence of peeling paint in or outside the house, eating paint chips and the geographic location of children. From the authors' findings, it is possible that geographic location could be a risk factor. Moreover, Department of Mineral Resources' report shows availability of white lead in Umpang District, and zinc in Mae Sot District, Tak Province. It should be noted that zinc and lead are usually found together[14]. The authors' findings indicate that source of drinking water is a risk factor which has an impact on EBLL. Children drinking water from tap and canal have 15 times and 72 times, respectively, a higher risk than children drinking bottled water. Tap water in this area comes directly from natural waters in the mountain via pipes. In other words, no standard process has been performed for converting natural water to drinking water.

From a study of NHANES III (1988-1991, 1991-1994) the prevalence of lead exposure decreases is dramatic, the percentage of US children 1-5 years of age with BLLs $\geq$ 10 ug/dl was only 6%[8,9]. According to the result, targeted screening is recommended in communities where < 12% of children has BLLs $\geq$ 10 ug/dl or $\geq$ 27% of houses was built before 1950. Centers for Disease Control and Prevention (CDC), Agency for toxic substances and disease registry (ATSDR) and American Academy of Pediatrics (AAP) recommend blood lead a screening policy that has remained unchanged since 1997[6-8]. The Ministry of Public Health and the Royal Collage of Pediatricians of Thailand suggests blood lead screening for Thai children under 15 years old and that children aged 18-24 months-old with a history of risk factors for lead exposure such as

Table 2. Average blood lead levels in relation to characteristics & environment among young children in Umphang, Tak, Thailand

Variable	number	percent	Blood lead level (ug/dl)		
			Avg.	SD	p-value*
Overall populations	213	100.0	7.7	4.6	
Sex					0.039**
Male	100	47.0	8.4	5.0	
Female	113	53.1	7.1	4.2	
Age (Year)					< 0.001**
3	12	5.6	8.1	4.5	
4	54	25.4	7.3	4.2	
5	90	42.3	6.6	4.3	
6	36	16.9	10.0	4.9	
> 6	21	9.9	9.8	5.1	
Nutrition Status					
Weight (n = 209)					< 0.001**
Normal Weight for Age	164	78.5	7.1	4.2	
Under Weight for Age	40	19.1	10.9	5.3	
Over Weight for Age	5	2.4	4.0	1.0	
Height (n = 208)					< 0.001**
Normal Height for Age	164	78.5	6.9	3.9	
Under Height for Age	44	21.1	11.2	5.7	
Head Circumference (n = 193)					0.59
Normal HC for Age	185	95.9	7.5	4.5	
Under HC for Age	8	4.2	8.4	5.1	
Developmental Assessment (n = 206)					0.001**
Normal	112	54.4	6.9	4.4	
Suspected	67	32.5	8.1	4.9	
Unable to evaluate	27	13.1	10.4	4.2	
History of breast feeding (n = 206)					0.015**
Yes	192	93.2	7.9	4.7	
No	14	6.8	5.4	3.2	
Living Location (n=211)					0.018**
Outside Municipality	127	60.2	8.3	4.5	
Inside Municipality	84	39.8	6.8	4.7	
Hand Washing before Meals (n=206)				0.26	
No	38	18.5	8.6	5.5	
Yes	168	81.6	7.5	4.5	
Source of Regular Food (n=208)					0.006**
Home Made	191	94.8	8.0	4.6	
Others	17	5.2	4.9	3.9	
Source of Drinking Water (n=209)					< 0.001**
Tap Water	95	55.2	9.4	4.2	
Bottle Water	68	18.9	4.5	2.2	
Canal Water	15	10.3	11.1	5.1	
Underground Water	6	1.5	4.0	0.6	
Rain Water	5	1.8	5.8	2.2	
Multi Sources of Water	20	12.3	10.0	6.7	
Preparation for Drinking Water (n=207)					0.27
No action taken	121	58.9	7.8	4.8	
Boiling	68	33.7	8.0	4.4	
Via Filter Equipment	13	4.4	5.5	4.5	
Via Filter Paper	5	2.9	9.4	4.8	

Table 2. Cont

Variable	number	percent	Blood lead level (ug/dl)		
			Avg.	SD	p-value*
Sources of Water for taking a bath (n = 208)					< 0.001**
Tap Water	165	79.3	6.9	4.0	
Multi Sources	20	9.6	10.1	5.3	
Canal Water	19	9.1	12.3	5.6	
Underground Water	4	1.9	10.5	6.0	
Use of Rechargeable Battery in House (n = 209)					0.001**
No	126	60.3	6.9	4.3	
Yes	83	39.7	9.0	4.9	
Providing Garage Services/Recharge Motor Vehicle Battery at House (n = 209)					0.6
No	194	92.8	7.7	4.7	
Yes	15	7.2	8.3	4.5	

*t-test, ** Significant at 95% CI

Table 3. Logistic regression model for risk factor associated EBLL (≥ 10 mcg/dl)

variable	Crude		Adjusted		p-value*
	OR	95% CI	OR	95% CI	
Male	0.45	0.24-0.84	2.82	1.18-6.78	0.018**
Age (Year)					
5	1				0.169
3	1.56	0.38-6.42	1.34	0.24-7.46	
4	1.34	0.58-3.09	1.81	0.58-5.62	
6	4.19	1.79-9.80	4.1	1.26-13.30	
> 6	3.51	1.27-9.74	3.2	0.80-12.81	
Having History of Breast Feeding	2.31	0.50-10.68	3.6	0.38-34.15	0.26
Living Outside Municipality	1.75	0.91-3.36	0.6	0.19-1.90	0.385
Cooking Meal at Home	7.28	0.95-55.87	16.22	0.98-269.61	0.052
No Washing Hands before Meals	1.78	0.84-3.75	1.19	0.40-3.53	0.753
Sources of Drinking Water					
Bottle Water	1				0.014**
Tap Water	21.69	5.01-93.90	15.3	2.59-90.36	
Canal Water	51	8.91-291.96	72.82	6.17-859.36	
Multi sources	22.67	4.28-120.00	7.46	1.01-55.21	
Preparation of Drinking Water					0.535
Via Filter Equipment	1				
Boiling	18	1.19-271.46	31.78	NA	
No Action Taken	4.65	0.57-38.29	1.26	0.08-20.25	
Via Filter Paper	4.4	0.55-35.17	1.23	0.07-20.69	
Source of Water for Taking a Bath					
Tap Water	1				0.25
Underground Water	1.3	0.13-12.93	0.22	0.01-6.35	
Canal Water	6.71	2.45-18.33	1.32	0.36-4.83	
Multi Sources	3.2	1.23-8.34	4.88	0.84-28.55	
Using Rechargeable Battery at home	2.46	1.32-4.58	1.91	0.82-4.43	0.14
Having Garage at Home, Charging Battery at Home	1.95	0.66-5.74	2.43	0.45-13.0	0.3

*Chi-square test, **Significant at 95% CI

living in industrial areas or living with persons who have an occupation relevant to lead[15]. However, the present study points out that the suggestion might not be suitable for all communities as seen as in the authors' study. This is because the authors' study indicates that our population is living in rural areas but they have blood lead level ≥ 10 ug/dl. It implies that there is no relationship between living areas and EBLL.

Conclusion and Suggestion

The result of the present study shows that 1 of 4 of Thai children aged between 3-7 years old has a blood lead level higher than the concerning level. It can be said that our population is exposed to lead. Due to low level of lead, no symptom is presented. Prevention and health education are the next actions which should be taken in order to eliminate lead exposure. Thus, it is necessary to identify risk factors of lead exposure and establish a policy for blood lead screening in each community. Providing an appropriate policy for each community has become a critical issue in the prevention effort in Thailand.

Potential conflicts of interest

None.

References

1. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations < 10 microg/dL and child intelligence at 6 years of age. Environ Health Perspect 2008; 116: 243-8.
2. Needleman HL, Gunnoe C, Leviton A, Reed R, Peresie H, Maher C, et al. Deficits in psychologic and classroom performance of children with elevated dentine lead levels. N Engl J Med 1979; 300: 689-95.
3. Canfield RL, Henderson CR Jr, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. N Engl J Med 2003; 348: 1517-26.
4. Pocock SJ, Smith M, Baghurst P. Environmental lead and children's intelligence: a systematic review of the epidemiological evidence. BMJ 1994; 309: 1189-97.
5. National Center for Environmental Health. Centers for Disease Control and Prevention. Childhood lead poisoning prevention program [database on the Internet]. 2009 [cited 2010 May 1]. Available from: http://www.cdc.gov/nceh/lead/lead.htm
6. Elevated blood lead levels among children in refugee camps Mae La, Umpiem, and Nupo refugee camis, Tak province, Thailand. Nonthaburi: Section of Occupational and Environment Diseases, Centers for Disease Control, Ministry of Public Health. [unpublished data].
7. Agency for Toxic Substances and Disease Registry. Lead toxicity. Case studies in environmental medicine [database on the Internet]. 2010 [cited 2010 May 1]. Available from: http://www.atsdr.cdc.gov/csem/
8. American Academy of Pediatrics Committee on Environmental Health. Lead exposure in children: prevention, detection, and management. Pediatrics 2005; 116: 1036-46.
9. Bernard SM, McGeehin MA. Prevalence of blood lead levels ≥ 5 micro g/dL among US children 1 to 5 years of age and socioeconomic and demographic factors associated with blood of lead levels 5 to 10 micro g/dL, Third National Health and Nutrition Examination Survey, 1988-1994. Pediatrics 2003; 112: 1308-13.
10. Wu AC, Lesperance L, Bernstein H. Screening for iron deficiency. Pediatr Rev 2002; 23: 171-8.
11. Ruangkanchanasetr S, Suepiantham J, Tapsart C, Sangsajja C. Blood lead level in Bangkok children. J Med Assoc Thai 1999; 82 (Suppl 1): S154-61.
12. Ruangkanchanasetr S, Suepiantham J. Risk factors of high lead level in Bangkok children. J Med Assoc Thai 2002; 85 (Suppl 4): S1049-58.
13. Chomchai C, Padungtod C, Chomchai S. Predictors of elevated blood lead level in Thai children: a pilot study using risk assessment questionnaire. J Med Assoc Thai 2005; 88 (Suppl 8): S53-9.
14. Cerussite. Bureau of Mineral Resources, Department of Mineral resources [Homepage on the internet]. 2010 [cited 2010 Dec 4]. Available from: http://www.dmr.go.th
15. Management of lead exposure [database on the Internet]. 2010 [cited 2010 May 1]. Available from: http://www.thaipediatrics.org/cpg.php

การประเมินการสัมผัสสารตะกั่วของเด็กไทยอายุ 3-7 ปีในพื้นที่อำเภออุ้มผาง จังหวัดตาก

นัยนา ณีศะนันท์, รัชดา เกษมทรัพย์, สุนทรี รัตนชูเอก, พวงพร กอจรัญจิตต์, ขิ่ม สกุลนุ่ม, ฉันทนา ผดุงทศ

ภูมิหลัง: *เนื่องจากมีรายงานของศูนย์ป้องกันและควบคุมโรค สหรัฐอเมริกาแจ้งมายังกระทรวงสาธารณสุขประเทศไทยว่าร้อยละ 13 ของเด็กผู้อพยพจากประเทศเมียนมาร์ที่ได้รับการส่งต่อไปยังสหรัฐอเมริกาตั้งแต่ปี พ.ศ. 2550-พ.ศ. 2552 มีระดับสารตะกั่วในเลือดสูงมากกว่า 10 ไมโครกรัม/เดซิลิตร โดยเป็นเด็กที่มาจากศูนย์พักพิงผู้อพยพในอำเภออุ้มผาง จังหวัดตาก และต่อมาในเดือนมิถุนายน พ.ศ. 2552 มีการศึกษาของกรมควบคุมโรค สหรัฐอเมริการ่วมกับ CDC/TUC และองค์กรระหว่างประเทศสำหรับผู้อพยพในประเทศไทย เกี่ยวกับสถานการณ์สารตะกั่วในเด็กผู้อพยพที่อาศัยอยู่ในค่ายแม่ลา อุ้มเปี้ยม และนุโพ จังหวัดตาก พบว่าเด็กผู้อพยพจำนวน 33 คน (ร้อยละ 5.1) จากเด็กทั้งหมด 645 คน มีสารตะกั่วในเลือดสูงมากกว่า 10 ไมโครกรัม/เดซิลิตร แต่ยังไม่มีการศึกษาสถานการณ์การสัมผัสสารตะกั่วในเด็กไทยที่อาศัยอยู่ในพื้นที่ใกล้เคียงกับศูนย์พักพิงผู้อพยพ ชาวเมียนมาร์ สถาบันสุขภาพเด็กแห่งชาติมหาราชินี จึงประสานกับหน่วยงานที่เกี่ยวข้องหน่วยงานพื้นที่จังหวัดตากเพื่อตรวจสุขภาพเด็กไทยและประเมินสถานการณ์พิษของสารตะกั่ว*

วัตถุประสงค์: *ประเมินการสัมผัสตะกั่วของเด็กไทยที่อาศัยในพื้นที่ใกล้เคียงศูนย์พักพิงผู้อพยพ และค้นหาปัจจัยเสี่ยงของการสัมผัสสารตะกั่วของเด็กในกลุ่มที่เข้าร่วมการศึกษานี้*

วัสดุและวิธีการ: *การศึกษาย้อนหลัง (retrospective study) โดยนำข้อมูลที่ได้จากการลงพื้นที่ตรวจสุขภาพเด็กไทยเมื่อ 30 เมษายน ถึง 5 พฤษภาคม พ.ศ. 2553 จำนวน 213 คน มาวิเคราะห์เพื่อประเมินสถานการณ์ของสารตะกั่วในเลือด และปัจจัยเสี่ยงต่อการได้รับสารตะกั่วของเด็กไทยอายุ 2-7 ปีที่อาศัยอยู่ อำเภออุ้มผาง จังหวัดตากทั้งใน และนอกเขตเทศบาล*

ผลการศึกษา: *เด็กที่เข้าร่วมการศึกษาทั้งหมด 213 คน อายุเฉลี่ย 54.53 $\pm$ 12.41 เดือน ตรวจพบมีค่าเฉลี่ยตะกั่วในเลือด = 7.71 $\pm$ 4.62 ไมโครกรัม/เดซิลิตร (ค่าต่ำสุดถึงสูงสุด = 3-25) และมีเด็กจำนวน 57 คน (ร้อยละ 26) มีค่าตะกั่วในเลือดสูงเกินเกณฑ์คือ $\geq$ 10 ไมโครกรัม/เดซิลิตร และพบว่ามีหลากหลายปัจจัยที่มีผลต่อระดับค่าเฉลี่ยตะกั่วในเลือดอย่างมีนัยสำคัญทางสถิติ (p-value $\leq$ 0.05) อาทิเช่น เพศชาย ภาวะโภชนาการที่ต่ำกว่าเกณฑ์มาตรฐาน ประวัติการเลี้ยงลูกด้วยนมแม่ แหล่งอาหาร และแหล่งน้ำที่ใช้ในการบริโภคอุปโภค มีการใช้แบตเตอรี่แบบเติมไฟได้ที่บ้าน เด็กที่อาศัยอยู่นอกเขตเทศบาล แต่เมื่อวิเคราะห์ค่าความเสี่ยงโดยควบคุมปัจจัยเสี่ยงทั้งหมด (adjusted OR) ที่มีผลต่อระดับตะกั่วในเลือดสูงเกินเกณฑ์พบว่ามีเพียงปัจจัยเรื่องเพศ และชนิดของน้ำที่ใช้ในการบริโภคเท่านั้นที่เป็นปัจจัยเสี่ยง โดยพบว่าเพศชายมีความเสี่ยงมากกว่าเพศหญิง 2.8 เท่า และการบริโภคน้ำประปา และน้ำคลองมีความเสี่ยงมากกว่าการบริโภคน้ำจากขวดน้ำดื่มสำเร็จรูป 15 เท่า และ 72 เท่าตามลำดับ*

สรุป: *จากการศึกษานี้พบว่า 1 ใน 4 ของเด็กอายุ 2-7 ปี มีระดับตะกั่วในเลือดที่สูงกว่าเกณฑ์ทำให้ทราบว่ากลุ่มตัวอย่างมีการสัมผัสสารตะกั่ว แม้จะมีปริมาณไม่สูงมากจนเกิดอาการพิษ และไม่สามารถวินิจฉัยจากการซักประวัติ และตรวจร่างกายแต่จากข้อมูลนี้ควรนำไปพัฒนาแนวทางการจัดทำกำหนดการคัดกรอง ดูแลสุขภาพเด็กไทยให้เหมาะสมในแต่ละพื้นที่*