Knowledge, Attitudes and Practices Relating to Plastic Containers for Food and Drinks

Rachada Kasemsup MD*,
Naiyana Neesanan MD*

** Division of Social Pediatrics, Department of Pediatrics, Queen Sirikit National Institute of Child Health, College of Medicine, Rangsit University, Bangkok, Thailand*

***Background**: Plastic is widely used in daily life especially as food and drink containers. If these containers are used inappropriately, some chemicals such as bisphenol A, phthalate, and styrene from plastic may accumulate and impair organ function.*

***Objective:** To assess knowledge, attitudes, and practices relating to plastic containers for food and drinks among parents and health personnel.*

***Material and Method:** 100 parents and 100 health personnel from Queen Sirikit National Institute of Child Health are included in the present study. The questionnaires which contained 6 parts measuring knowledge, attitudes and practices about plastic containers for food and drinks are used to collect the data.*

***Results:** There are no differences in knowledge, attitudes and practices relating to plastic containers between parents and health personnel. Even though, 80 percent of participants usually use plastic containers for food and drinks, their knowledge about plastic is inadequate.*

***Conclusion:** Parents and health personnel are aware of health effects of plastic containers, but they do not know how to use and purchase plastics properly.*

***Keywords:** Plastic containers*

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In 2009, Department of Health implemented "Food Safety Project" in order to reduce the incidence of food related diseases among children and improve their nutrition status. The project targeted children in schools nationwide and aimed to change behaviors by providing proper source of food and drinking water as well as knowledge. According to this project, Queen Sirikit National Institute of Child Health started "Safe Food, Safe Plastic Containers" project which focused on proper use of plastic containers for food and drinks by studying on current situation among parents and promoting knowledge by using posters, flyers and games.

Nowadays, plastic is widely used in daily life especially as food and drink containers. Some chemicals from plastic may accumulate in the human body and impair organ function such as bisphenol A (BPA), phthalate and styrene. For example, BPA is a chemical that is used in polycarbonate bottles including baby bottles. Results from several animal studies showed that low doses of BPA in a fetus interfered with development of nervous and reproductive system and may also cause cancers. National Toxicology Program at the National Institute of Health in the United States recently published the report mentioning some concern about the potential effects of BPA on the brain, behavior and prostate gland in fetuses, infants and young children. Recently, FDA suggested the reduction of BPA exposure in humans by using BPA-free baby bottles and plastic containers[1-3]. Phthalate is another chemical found in polyvinyl chloride plastics such as plastic wrap. From animal studies, phthalate was found to interfere with hormone production and has been called a "hormone disruptor," that may also be a liver carcinogen[4,5].

However, the avoidance of plastic containers for food and drink may be unfeasible, the recommendation is to select plastic of good quality

Correspondence to:
Kasemsup R, Division of Social Pediatrics, Department of Pediatrics, Queen Sirikit National Institute of Child Health, Bangkok 10400, Thailand.
Phone & Fax: 0-2354-8439
E-mail: rachada08@gmail.com

and use it properly. In the present study, the authors would like to assess the knowledge and attitudes relating to plastic containers as well as practice and frequency of plastic use for food and drinks among parents and health personnel.

Material and Method

The present study was approved by the Ethics Committee of Queen Sirikit National Institute of Child Health. The questionnaire was developed to assess knowledge, attitudes and practices relating to plastic food containers for food and drinks by using a three-point Likert type scale. The knowledge and attitude section have 11 and 9 items respectively. The practice part, which has 12 items, assesses the frequency of practice in its weekly and the selection of food and drink containers. Demographic data were collected (age, education, employment, and family income) and also data about the source of food and containers. The questionnaire was pilot-tested for its understanding and appropriateness with 5 health personnel. Between June 1st, 2010 and September 31st, 2010, one hundred parents and one hundred health personnel were recruited by direct contact. The consent form was signed by participants before receiving the questionnaire. Data were analyzed by using descriptive analysis (SPSS version 12). Pearson Chi-square and Independent-Samples t-test were used to compare the results between parents and health personnel. All tests were two-tailed and defined significance as $p < 0.05$.

Results

One hundred health personnel and one hundred parents completed the questionnaires. The demographic data comparing between 2 groups are concluded in Table 1. Most participants were female. There were significant differences in marital status, education, employment and family income between health personnel and parents. Health personnel tend to be more educated and received higher income than parents.

Regarding knowledge about plastic containers for food and drink, the total score was 11, but the range of scores was 2-9. Participants who scored 8-11 ($\geq$ 75%) were ranked as "good", scored 5-7 ($\geq$ 50%) as "fair", and scored 1-4 (< 50%) as "poor". The frequencies of knowledge score are shown in Table 2. More than eighty percent of participants knew the right answer of only 3 from total 11 items in the questionnaire. These items are: "Plastic containers could not keep every kind of food safely", "Not every kind of plastic could be used to warm food in a

Table 1. Demographic characteristics of health personnel (n = 100) and parents (n = 100)

Characteristics	Health Personnel n (%)	Parents n (%)	p-value
Gender			
Female	98 (98)	94 (94)	
Male	2 (2)	6 (6)	0.149
Age (mean $\pm$ SD)	39.4 $\pm$ 10.8	34.6 $\pm$ 10.3	0.381
Marital status			
Single	41 (41)	20 (20)	
Married	44 (44)	71 (71)	
Divorced	12 (12)	7 (7)	
Widow	3 (3)	2 (2)	0.002*
Education			
High school or less	41 (41)	52 (52)	
Some college or more	59 (59)	48 (48)	0.001*
Employment			
Public	100 (100)	32 (32)	
Private		40 (40)	
Housewife		28 (28)	0.000*
Family income			
< 10,000	23 (23)	44 (44)	
10,001-30,000	61 (61)	41 (41)	
> 30,000	16 (16)	15 (15)	0.007*

*$p < 0.05$ according to Pearson Chi-Square

microwave safely" and "Baby bottles should be discarded when there is a crack or change of color." Moreover, there were 4 items that less than 40 percent of the participants knew. These items were: "Plastics are made from natural gas", "Melamine containers should not be used in a microwave", "Plastic wrap should not come into direct contact with food. It should be placed at least 1 inch from food" and "Plastics of white or clear color have a better quality and are safer than colorful plastic". When data were analyzed separately, there was only one item that health personnel and parents answered differently. The item is: "Every kind of plastics could be used to warm food in a microwave safely". Ninety-five percent of health personnel answered "no", compared to only seventy-nine percent of parents.

Regarding attitude about plastic containers for food and drink, the total score was 9 and the range of scores was 3-9. Participants who scored 7-9 ($\geq$ 75%) were ranked as "good", scored 4-6 ($\geq$ 50%) as "fair" and scored 1-3 (< 50%) as "poor". The frequencies of attitude score are shown in Table 2. More than eighty percent of participants agreed with the right answer on only 4 from the total of 9 items in the questionnaire. These items are: "It is possible that we could receive chemicals from plastic containers", "Knowledge about health effects from plastic containers should be distributed", "We should avoid using plastics with hot drinks or food" and "There should be enforcement on food providers to stop using Styrofoam".

Regarding practices about plastic containers for food and drink, frequencies of plastic use are displayed in Table 3. The practice score is shown in Table 2. The total score is 32 and the range of scores is 12-32. Participants who scored 24-32 ($\geq$ 75%) were ranked as "frequent users" of plastic products for food and drink, scored 16-23 ($\geq$ 50%) as "occasional users", and scored 0-15 (< 50%) as "rare users".

Moreover, the questionnaire includes items relating to symbols on plastic containers. About eighty percent of participants noticed symbols on plastic containers, but only seventy percent knew about the symbols which certified the quality of plastic containers by the Department of Industry and only forty percent noticed the symbols which certified that a plastic container could be used to store food and drink.

Discussion

From the present study, most of the health personnel and parents usually use plastic containers for food and drinks. About eighty percent of participants eat food in foam at least once a week, even though they agreed that foam should not be used to store food. Ninety-five percent of participants also thought that there may be a risk of chemical contaminants from plastic containers, but sixty percent eat ready-to-eat frozen food once a week. It can be seen that attitude scores are higher than knowledge scores, in general, which may reflect that consumers are aware of adverse side effects from plastic containers, but they require more knowledge about plastic use for food and drink such as types of plastic containers and their specification, symbols for consumers, microwave use, etc. Most of the participants accepted that the effect of plastic containers on health should be studied and made known to consumer public.

Table 2. The frequencies of knowledge attitude and practice score (n = 200)

Group	Health Personnel n (%)	Parents n (%)	Total n (%)	p-value[1]
Knowledge score				
Good	10 (10)	7 (7)	17 (8.5)	
Fair	69 (69)	66 (66)	135 (67.5)	
Poor	21 (21)	27 (27)	48 (24)	0.076
Attitude score				
Good	72 (72)	53 (53)	125 (62.5)	
Fair	25 (25)	45 (45)	70 (35)	
Poor	3 (3)	2 (2)	5 (2.5)	0.087
Practice score				
Frequent user	80 (80)	88 (88)	168 (84)	
Occasional user	19 (19)	12 (12)	31 (15.5)	
Rare user	1 (1)	0 (0)	1 (0.5)	0.133

[1]Independent-Samples t-test

Table 3. Practices relating to plastic containers for food and drink (n = 200)

Items	Frequencies of plastic use per week n (%)			
	Usually (5-7 days/wk)	Sometimes (3-4 days/wk)	Occasionally (1-2 days/wk)	Never
1. How often do you use plastic containers to warm food or drink in a microwave?	6 (3)	18 (9)	44 (22)	132 (66)
2. How often do you reuse plastic bottles to keep drinking water?	35 (17.5)	42 (21)	72 (36)	51 (25.5)
3. How often do you put plastic wrap on food containers storing leftover food?	9 (4.5)	19 (9.5)	27 (13.5)	145 (72.5)
4. How often do you put plastic wrap on food containers to warm food or drink in a microwave?	5 (2.5)	10 (5)	11 (5.5)	174 (87)
5. How often do you eat food storing in foam?	13 (6.5)	38 (19)	106 (53)	43 (21.5)
6. How often do you eat ready-to-eat frozen food?	5 (2.5)	25 (12.5)	90 (45)	80 (40)
7. How often do you warm food in a plastic bag by using a rice cooker?	6 (3)	17 (8.5)	37 (18.5)	140 (70)
8.How often do you keep plastic bottles for drinking water in a hot place such as a car for a long time?	4 (2)	9 (4.5)	45 (22.5)	142 (71)

Regarding chemical exposure in the general population, the 2003-2004 National Health and Nutrition Examination Survey (NHANES) in the United States measured urinary concentrations of BPA[7]. The results showed that urinary BPA was detected in 92.6% of 2,517 participants and children had the highest concentration. In Thailand, even though there is no data relating to urinary BPA, concerns regarding its exposure should be raised especially among infants and toddlers because BPA is composed in baby bottles. For further study, the authors would like to measure urinary BPA in children.

Therefore, the public awareness of improper plastic uses should be raised and knowledge relating to purchasing and using plastic containers for food and drinks should be distributed to the public. However, more scientific data are needed to specify the actual effects on health from these chemicals.

Potential conflicts of interest

None.

References

1. National Toxicology Program (NTP). Bisphenol A [database on the Internet]. 2010 [cited 2010 Aug 30]. Available from: http://niehs.nih.gov/health/docs/bisphenol-a-factsheet.pdf
2. U.S. Food and Drug Administration (FDA). Update on Bisphenol A for use in food contact applications [database on the Internet]. 2010 [cited 2010 Aug 30]. Available from: www.fda.gov/downloads/newsevnets/publichealthfocus/UCM197778.pdf
3. International Food Safety Authorities Network (INFOSAN). Bisphenol A (BPA) - Current state of knowledge and future actions by WHO and FAO [database on the Internet]. 2010 [cited 2010 Aug 30]. Available from: www.who.int/foodsafety/publications/fs_management/No_05_bisphenol_a_Nov09_en.pdf
4. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Di(2-ethylhexyl)phthalate (DEHP) [database on the Internet]. 2002 [cited 2010 Aug 30]. Available from: http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=684&tid=65
5. Agency for Toxic Substances and Disease Registry (ATSDR). Toxic substances portal. Di(2-ethylhexyl) phthalate (DEHP) [database on the Internet]. 2002 [cited 2010 Aug 30]. Available from: www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=65
6. U.S. Department of Health and Human Services. National Toxicology Program. NTP-CERHR Monograph on the potential human reproductive and developmental effects of di (2-ethylhexyl)phthalate (DEHP). NTP CERHR MON 2006; (18): i-III76
7. Calafat AM, Ye X, Wong LY, Reidy JA, Needham LL. Exposure of the U.S. population to bisphenol A and 4-tertiary-octylphenol: 2003-2004. Environ Health Perspect 2008; 116: 39-44.

สถานการณ์การใช้ภาชนะพลาสติกบรรจุอาหารและน้ำดื่ม

รัชดา เกษมทรัพย์, นัยนา ณีศะนันท์

ปัจจุบันภาชนะพลาสติกถูกนำมาใช้บรรจุอาหาร และเครื่องดื่มอย่างแพร่หลายแต่ถ้าใช้อย่างผิดวิธี สารเคมีที่อยู่ในภาชนะ เช่น bisphenol A phthalate และ styrene อาจจะปนเปื้อนไปกับอาหารและเครื่องดื่มบริโภคได้ และรบกวนการทำงานของอวัยวะต่างๆในร่างกายหรือก่อโรคได้

วัตถุประสงค์*: เพื่อศึกษาความรู้และทัศนคติเกี่ยวกับภาชนะพลาสติกบรรจุอาหารและน้ำดื่ม และพฤติกรรมการใช้ภาชนะพลาสติกบรรจุอาหารและน้ำดื่มของพ่อแม่ผู้ปกครอง และบุคลากรทางการแพทย์ ในสถาบันสุขภาพเด็กแห่งชาติมหาราชินี*

วัสดุและวิธีการ*: ทำการศึกษาในพ่อแม่ผู้ปกครองจำนวน 100 คน และบุคลากร 100 คน โดยใช้แบบสอบถามซึ่งมีทั้งหมด 6 ส่วน เพื่อประเมินความรู้ ทัศนคติ และพฤติกรรม*

ผลการศึกษา*: ไม่พบความแตกต่างของความรู้ ทัศนคติ และพฤติกรรมระหว่างกลุ่มพ่อแม่ผู้ปกครอง และบุคลากร อย่างไรก็ตามพบว่าร้อยละ 80 ของประชากรใช้ภาชนะพลาสติกบรรจุอาหาร และเครื่องดื่มเป็นประจำ แต่ยังใช้ไม่ถูกต้อง เช่น การใช้ภาชนะเมลามีน การอุ่นอาหารด้วยไมโครเวฟ*

สรุป*: ประชากรมีความตระหนักถึงผลของการใช้ภาชนะพลาสติกบรรจุอาหารต่อสุขภาพ แต่ยังขาดความรู้ในด้านของการซื้อและการใช้*