International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Survey Paper on Assessment of Knowledge Regarding Storage of Food and Water in Plastic Containers

Gowri M Mudaliar[1], Sudha[2]

[1]College of Nursing, Command Hospital, Central Command, Lucknow - India

[2]College of Nursing, Command Hospital, Central Command, Lucknow – India

Abstract: ***Introduction: Nowadays Disposable Plastic Containers have become the conventional commodity used everyday in the various avenues of our lives. Regardless of their cost - effective nature, easy accessibility, convenient transportation and easy maintenance and disposal, the indiscriminate use of them is matter of prime concern. The inappropriate use of these containers may lead to the leaching of various chemicals from plastic, such as bisphenol A, phthalate, and styrene, which cause myriad of detrimental health effects. This survey aimed to assess the knowledge, toward using plastic for food and drinks among a sample of the villagers of Dadupur, Banthra, Uttarpradesh. Materials and Methods: A questionnaire was designed based on scientific literature to assess the knowledge, towards the use of plastic for food and drinks. A total of 120 family's representative participants were recruited by employing the convenience sampling technique. Results: More than half of the participants (54.84%) had poor knowledge scores, whereas 44.16% were aware about the food grade plastics. The majority (77.5%) were occasional and (22.5%) frequent plastic users.45.83% people are aware about the fact that use of non - food grade plastic causes cancer and 54.16% People are not having any idea about the same. Only 9.16% are aware about the resin identification code and 90.83% people are not aware about it. 10.8% people use plastic containers to serve or consume hot food stuffs and 89.16% people do not use them. Higher educational level, gender (men), and rural residence were predictors of good participants knowledge. Conclusion: The larger part of the participant families had only rudimentary knowledge regarding the health risk of plastic usage; this modest score indicates informational abyss that can help orchestrate prospective upgrades. This inadequate knowledge hampers the people in adopting healthy choices as consumers and use safe alternatives. The study calls for public awareness programs about safe plastic use and the related health hazards of plastic chemicals. The survey further emphasizes upon the earnest need for a fraternization between health authorities and the plastic and food service industry to assure that information about appropriate plastic use is communicated to clientele.***

Keywords: plastic containers, knowledge, survey

1. Introduction

Plastic is an imperative part of modern world. Plastic containers are substantially used in almost every household and food industry to store, serve and transport edibles. In production of some types of plastic, chemicals such as bisphenol A (BPA) are used to impart valuable attributes to plastic like tamper resistance, lightweight, and heat proof (1). Invariably, these chemical have the tendency to lixiviate from the plastic containers into the edibles. In addition, BPA is now ubiquitous in the environment (1). BPA containing plastic has been in rampant use for over few decades and there has been incessant reporting of its toxic impact on every possible body systems (2, 3, 4).

Although eliminating plastic completely from our lives, sounds impractical, but the need of the hour is to create awareness in the community pertaining to its deleterious effects of these chemicals on health and to precisely define their warning labels ("BPA free" - Resin identification codes) which will consequently conjure inclination of people to reduce, recycle, reuse and enable them to opt for correct plastic materials.

Earlier studies have reported awareness among the general population in India regarding health hazards and environmental toxicity associated with the usage of plastic bags, but we have not come across any study assessing awareness regarding health hazards of plastic chemicals and their warning labels.

A recent study investigated the habits related to food packaging in a sample of Portuguese citizens and their knowledge and concerns about its use, with the majority confirming that they think about the negative impact of plastic packaging. Most of the interviewees had concerns about the use of plastic packaging, and 55% reported that they are attempting to change their habits to avoid the use of plastics in this context (5). In addition, several studies in different countries reported poor knowledge and practices of individuals regarding the use of plastic for food and drinks (6, 7). In that context, the United Nations Environment Programme statement suggested a 10 - step plan for decision - makers. Increasing user awareness is one of them (8). This study aimed to assess the knowledge toward the safe use of plastic containers for food and drinks

A survey based, cross - sectional study was planned to assess the day - to - day behaviour of the local population, which may be enhance its exposure to plastic chemicals such as BPA and BPS. Furthermore, prevailing level of awareness about health hazards caused by plastic chemicals and understanding labels on plastic items was explored. The awareness level was described by an arbitrary scale, as described later.

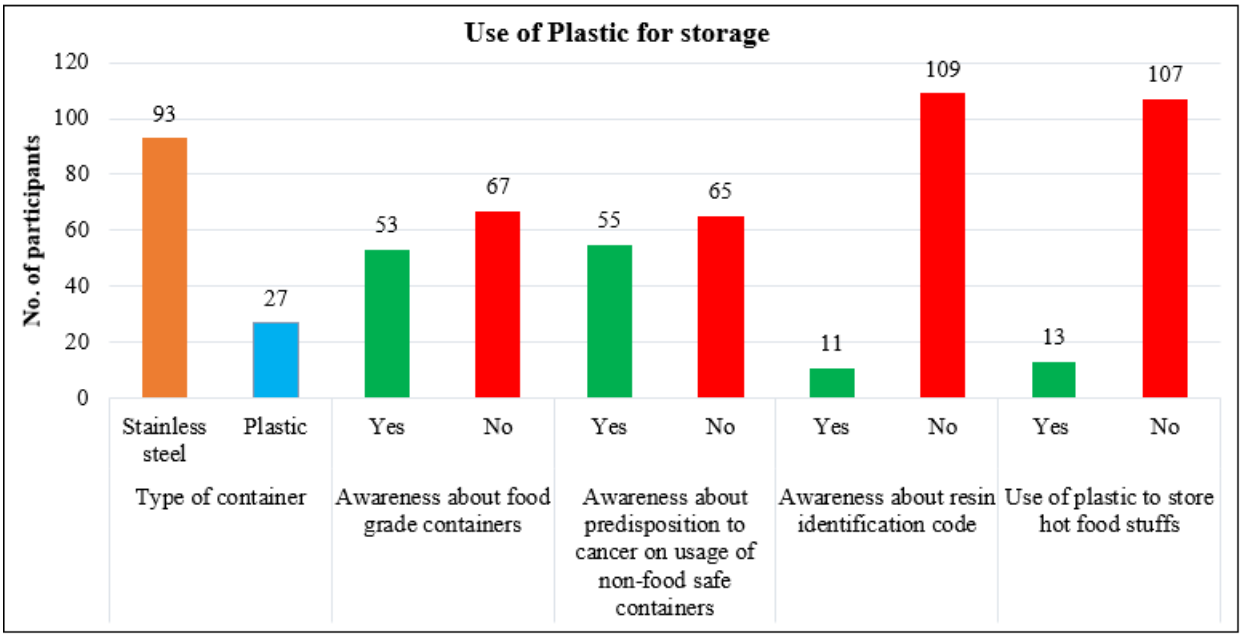
2. Materials and Methods

A cross - sectional study was conducted among the family's representative of Dadupur Village Banthra dependent on RHTC Banthra for Health Care Services. Household member as representative were randomly selected using convenient sampling technique. Permission was taken from RHTC Banthra MOI/C before study. This study was of single - blind type as identities of participants were kept confidential. Interview of 120 family's representatives having age>18 years was conducted using structured questionnaire to get information about the knowledge regarding the use of plastic to store food and water. Questionnaire validation was done by MOI/C RHTC Banthra.

The questionnaire was in the form of multiple - choice questions and took 5 mins to complete it. The questionnaire included the questions regarding the use of food contact plastic items in routine practices and questions to evaluate knowledge of participants in regard to recognition of safe types of plastics (warning labels on food contact plastic items), types of chemicals leaching plastics, kinds of potential health hazards and precautions to reduce these risks.

Statistical Analysis

The data obtained from the survey were maintained in MS Excel and were analysed using trial version 25.0 of SPSS. Chi square test was used to analysed the data. The significance level was $P<0.05$.



3. Results

120 Families representative participated in the survey. This included both male and females. The age of the participant was more than 18 years.

Out of 120 sample selected 77.5% uses stainless steel to store food and water on the other hand 22.5% used plastic containers.

44.16%, people are aware about the food grade and food safe plastic and 55.84% people have no clue about it.

45.83% people are aware about the fact that use of non - food grade plastic causes cancer and 54.16% People are not having any idea about the same.

Only 9.16% are aware about the resin identification code and 90.83% people are not aware about it.

10.8% people use plastic containers to serve or consume hot food stuffs and 89.16% people do not use them.

4. Discussion

Most of the participants of our survey admitted to follow conventional use of plastic containers that may cause percolation of plastic chemicals into their edibles. Plastic bottles, especially when in contact with hot liquids, makes our system vulnerable to get exposed to these toxic chemicals. Previous studies have revealed that BPA can leach from plastic bottles and process is enhance manifold with high temperature and vigorous washing (10, 11, 12, 13, 14, 15) Children are more susceptible to its devastating affects attributed to their biological immaturity (9)

While microwave has emerged as one of the quick and convenient cooking modalities, most of the microwaves users among the participants admitted preferred use of plastic containers over other microwave safe containers for heating food. Food safe labels doesn't warrant to be biologically safe, in fact they have been found to be highly toxic to aquatic animals and are potential threat to humans. The studies reveal that even the microwave safe plastic containers on repeated heating and washing lixiviate toxic chemicals (16, 17, 18, 19) The unfamiliarity about "resin identification code" and "food grade plastic" among

microwave users further enhances their risk of exposure to these lethal chemicals.

Plastic water bottles may leach toxin chemicals into drinking water. (20) Similarly, plastic overhead tanks are exposed directly to the sun, especially during summers, leaching can be further increased (22) It has been reported that exposure to boiling water ($100^0{}_C$) increased the rate of BPA migration by up to 55 - fold (22) Water stored in overhead tanks is directly channeled into water purifiers, which are themselves made up of the plastic (20) These water purifiers clean the water by eliminating microbes but the removal of leached toxic chemicals if not claimed (20, 21)

Similarly, use of plastic lunch box, reuse of the non - recyclable plastic bags and plastic food containers, may increase the risk of oral exposure to plastic chemicals.

Most of the participants have a basic understanding that the use of plastic may have an adverse impact on their health; most of them lacked the necessary knowledge of plastic chemicals warning labels that can help them to make healthy choices as consumers. Interestingly most of these practices are avoidable.

Usage of plastic when essential, using only food grade, looking for safe resin identification code while purchasing water bottles and lunch boxes, discarding the plastic containers after few washes, avoiding use of plastic containers in microwave.
It was also observed that despite basic information that prevailing day - to - day practices, plastic may release harmful chemicals and may expose to ill health impact of these chemicals, the willingness for decreasing the use of plastic and preferring plastic substitutes was not observed in most of participants.

5. Conclusion

Most of the participants in our study lacked the key information about the health hazards to toxic plastic chemicals safe practices to curtail them. Similarly, the knowledge about resin identification code, which is crucial for the masses to make safe choices as a consumer was also lacking. There is necessity for spreading the awareness in the masses through various modes of mass media by Government and non - government organizations regarding health hazards of plastic chemicals and use of alternatives of plastic.

References

[1] Vandenberg L N, Hauser R, Marcus M, Olea N, Welshons W V. Human exposure to bisphenol A (BPA) Reprod Toxicol.2007; 24: 139 - 77 [Pub Med] [Google Scholar]
[2] Pant J, Deshpande S B. Acute toxicity of bisphenol A in rats. Indian J Exp Biol.2012; 50: 425 - 9 [PubMed] [Google Scholar]
[3] Nirja K, Sharma P, Tiwari AK. Plastic toxin Bisphenol A depresses the contractile activity of rat ileum and colon in vitro. Indian J Physiol Pharmacol.2018; 62: 202 - 8. [Google Scholar]
[4] Michalowicz J. Bisphenol A - Sources, toxicity and biotransformation. Environ Toxicol Pharmacol.2014; 37: 738 - 58 [PubMed] [Google Scholar]
[5] Weber Macena M, Carvalho R, Cruz - Lopes LP, Guiné RPF. Plastic food packaging: perceptions and attitudes of Portuguese consumers about environmental impact and recycling. *Sustainability*. (2021) 13: 9953.10.3390/su13179953 [CrossRef] [Google Scholar]
[6] Praveena BG. A study to assess the knowledge regarding health hazards of plastic in domestic use and attitude toward the use of alternatives in women residing at Mohan Kumar Nagar, Bengaluru. *Int J Nur Med Invest.* (2019) 4: 50–3.10.31690/ijnmi/50 [CrossRef] [Google Scholar]
[7] Srinivasan N, Swarnapriya V. Assessment of knowledge and practice on plastics among the professional course students of Annamalai University, Tamil Nadu. *Int J Commun Med Public Health*. (2019) 6: 510–4.10.18203/2394 - 6040. ijcmph20190099 [CrossRef] [Google Scholar]
[8] UNEP. *Single - use plastics: A Roadmap for Sustainability* (2018). (accessed December 2022). [Google Scholar]
[9] Moghadam Z A, Mirlohi M, Pourzamani H, Malekpour A Bisphenol A in "BPA Free bottles. J Res Med Sci.2012; 17: 1089 - 91 [PMC free article] [PubMed] [Google Scholar]
[10] Maragou N C, Makri A, Lampi EN, Thamaidis NS, Koupparis MA. Migration of bisphenol A from polycarbonate baby bottles under real use conditions. Food Addit Contam part A Chem Anal Control Expo Risk Assess.2008; 25: 373 - 83 [Pub Med] [Google scholar]
[11] Cao XL, Corriveau j. Migration of bisphenol A from polycarbonate baby and water bottles into water under severe conditions. L Agric Food Chem.2008; 56: 6378 - 81. [Pub Med] [Google scholar]
[12] Simoneau C Valzacchi S, Morkunas V, Van den Eede L. Comparison of migration from polyethersulphone and polycarbonate bottles. Food Addit Contam Part A Chem Anal Control Expo Risk Assess.2011; 28: 1763 - 8 [Pub Med] [Google scholar]
[13] Nam SH, Seo Y M, Kim MG. Bisphenaol A migration from polycarbonate bottle with repeated use. Chemosphere.2010; 79: 949 - 52. [Pub Med] [Google scholar]
[14] Shrinithivihahshini ND, Mahamuni D, Praveen N. Bisphenol A migration study in baby feeding bottles of selected brands available in the Indian Market. Curr Sci.2014; 10: 1084 - 6 [Google scholar]
[15] Muncke J, backhaus T, Geuke B, Maffini MV, Martin OV, Myers J P, et al. Scientific challenges in the risk assessment of food contact materials. Environ Health perspect.2017; 125: 095001. [Pub Med] [Google scholar]
[16] Food safety. Microwaving food in plastic; dangerous or not? Harv Womens Health watch.2006; 13: 6 - 7 [Pub Med] [Google scholar]
[17] Freeman S. Plastic food contact articles - Food chemical safety unwrapped. Environ Health Rev.2018; 61: 92 - 7 [Pub Med] [Google scholar]

[18] Hahladakis JN, Iacovidou E. closing the loop on plastic packaging materials: What is quality and how does it affect their circularity? Sci Total Environ.2018; 630: 1394 - 400 [Pub Med] [Google scholar]
[19] Hamlin HJ, Marciano K, downs CA. Migration of nonylphenol from food grade plastic is toxic to the coral reef fish species Pseudochromis fridmani. Chemosphere.2015; 139: 223 - 8. [Pub Med] [Google scholar]
[20] Honeycutt J A, Nguyen JQ, Kentner A C, Brenhouse H C. Effects of water bottle materials and filtration on Bisphenol A content in laboratory animal drinking water. J Am Assoc lab Anim Sci.2017; 56: 269 - 72. [Pub Med] [Google scholar]
[21] Yuksel S, Kabay N, Yuksel M. Removal of bisphenol A (BPA) from water by various nanofiltration (NF) and reverse osmosis (RO) membranes. J Hazard mater.2013: 263 (Pt2): 307 - 10. [Pub Med] [Google scholar]
[22] Le HH, Carlson EM, Chua JP, Belcher SM. Bisphenol A is released from polycarbonate drinking bottles and mimics the neurotoxic actions of oestrogen in developing the cerebellar neurons. Toxicol Lett.2008; 176: 149 - 56. [Pub Med] [Google scholar]