

Effectiveness of Educational Intervention on Knowledge, Attitude and Practices of Children's Mothers Regarding the Safe Use of Plastic Containers

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Abstract Background: Plastic first became available to consumers. However, improper use of plastic has a number of hazards that plastic poses, including health problems starting from manufacturing to consumption through the process of leaching. **Aim of the study:** this study aimed to assess the knowledge, attitudes and practice of children's mothers regarding the safe use of plastic containers and evaluate the effect of educational intervention on mothers' knowledge, attitude and practice of children's mothers regarding the safe use of plastic containers. **Subjects and Methods:** A Quasi-experimental design was used. This study conducted in three setting at Assiut and Sohag cities in Egypt. A total of 120 children's mothers included using the convenience sampling technique. A structured interview schedule was designed to assess socio-demographic data and knowledge, attitude and practice of children's mothers regarding safe use of plastic containers at pre- and post-intervention. **Results:** The mean age of participants' mothers was 29.00 ± 5.41 years. The study revealed statistical significance improvement for the satisfactory knowledge, positive attitude and proper uses' percentages of children's mothers about the safe use of plastic ($P=0.000$). In addition, there was a positive correlation among knowledge, attitude and practice of children's mothers. **Conclusion:** The post-intervention improving of knowledge, attitude and practice pointed to effectiveness of the program. Therefore, the researchers recommended that all the health care providers such as nurses, village health guides, nurses working in community center or schools should provide in-service education regarding safe use of plastics.

Keywords: *intervention program, children's mothers, knowledge, attitude, practice and safe use of plastic*

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1. Introduction

Day by day peoples are becoming more and more dependent on the use of plastics because of its characteristics as inexpensive, lightweight and durable materials, which can be molded into a variety of products [1]. Consequently, over the last 60 years the production of plastics has markedly increased. Currently, plastic is extensively included in nearly every aspect of our daily life especially as small households needs like containers food and drink and grocery bags [2]. Worldwide, 20 or more types of plastics are currently used. Annually, 300 million or more tons of plastics are produced all over the world and nearly half of them is for disposable use [3].

Approximately 50 percent of plastics are used for single-use disposable applications, such as packaging,

agricultural films and disposable consumer items, between 20 and 25 percent for long-term infrastructure such as pipes, cable coatings and structural materials, and the remainder for durable consumer applications with intermediate lifespan, such as in electronic goods, furniture, vehicles, etc [1]. Plastic has some special properties such as; high heat combustion, the water content of the plastics is far lower than the water content in the biomass, plastics do not absorb much moisture and increasing availability in the local community [4].

Several chemical substances are ingredients of the plastic used for manufacturing bottles or containers such as Bisphenol A (BPA), brominated flame retardants, thalates and poly-fluorinated chemicals. Most of these substances are potentially hazardous to human body as they are persistent organic pollutants because of the combined effects of being persistent in the environment and of high toxicity level [5,6]. Storage of food or drinks

in plastic containers allows for minimal amounts of the chemical substances to migrate to food and drinks through the process of leaching which means that, some plastic chemical ingredients enter the food or water. Accordingly, when plastic water or baby bottles and the inner linings of food cans are reused, chemical substances as BPA leach into food over time, especially with heating [7].

However, the exclusion of plastic containers for food and drink may be not possible but the wise opinion is the selection of safe plastic with high quality and its ideal use [8]. It is very essential and mandatory to raise the awareness and knowledge of the parents or teachers regarding hazards of plastic use that can change their attitude and hence their practice concerning the proper and safe methods [9]. Children are more liable to the plastic adverse effects because of the long lasting exposure since childhood, which can be brought down through improving the knowledge via education given to them in the school days and change of the life style at early age of life [10].

Vigneshwaran and Arun-kumar [4] reported that, the awareness of the society particularly, parents, teachers and nurses should be raised regarding the adverse effects of plastic use to the nature and human being especially children. In addition, their knowledge, attitude and practice on plastic usage should be measured which is helpful to change their incorrect background. The nurse should have a major role in the guidance of children's mothers regarding the safe use of plastic and help them to use paper or cloth bags instead of the plastic ones [9].

1.1. Significance of the Study

Improper use of Plastic has several adverse effects on human health including kidney and liver damage, reduced immune function, cataract, abnormalities of respiratory function, development of obesity and diabetes [1]. National Health and Nutrition Examination Survey (NHANES) studied the chemical exposure in the general population (2003-2004) and measured the level of Bisphenol A (BPA) which is standard ingredient of plastic bottles in the urine. They found that, urinary BPA was detected in 92.6% of 2,517 participants and with the highest concentration in children [11].

According to the observation of the wide use of plastic containers whether bottles or dishes of unsafe and unlicensed origin in our locality and the poor knowledge regarding safe plastic use and rarity of researches concerning safe plastic use. This issue seeks attention not only from the health point of view, but also environmental values attached to it This could be possible through the education given to them. Therefore, the researchers designed this study.

1.2. Aims of the Study

This study aimed to:

- assess the knowledge, attitudes and practice of children's mothers regarding the safe use of plastic containers.
- evaluate the effect of educational intervention on mothers' knowledge, attitude and practice of children's mothers regarding the safe use of plastic containers.

1.3. Operational Definition

Hazards of plastics: It refers to the ill effects that are occurring due to the improper uses of plastics.

Plastic containers: In this study, it refers to products from plastic materials such as feeding bottles, plates, tubes, toys, etc.

1.4. Hypothesis

H1: The post program mean knowledge scores of children's mothers who will be exposed to educational nursing program will be higher than their pre program mean knowledge scores.

H2: The post program mean practice scores of children's mothers who will be exposed to educational program will be higher than their pre program scores.

H3: The post program positive attitude scores of children's mothers who will be exposed higher than their pre program scores.

1.5. Research Design

Quasi-experimental design was used.

1.6. Setting of the Study

The study was carried out in immunization clinic at Assiut University Children Hospital and two Maternal Child Health (MCH) centers (Dar El-Salam and Medical Center) at Sohag. They are working on Monday and Wednesday/week from 9am to 2pm.

1.7. Sampling

Researchers used convenience-sampling technique for this study.

1.8. Sample Size

The study included 120 mothers with the following inclusion criteria: the mothers who are willing to participate, mothers who are available at the time of data collection and mothers who had under 2 years old child. The mothers who dropped at follow-up were excluded.

1.9. Tools of Data Collection

Investigators used two tools to accomplish this study:-

Tool (1): A structured interview schedule:

The investigators based on reviewing the relevant literatures developed it and utilized to fill out the questionnaire sheet and divided it into four main parts to assess the followings:

Part 1) Socio-demographic characteristics:

Including child and mother age, residence, mother's educational level and mother's occupation.

Part 2) Knowledge of Children's Mothers:

Researchers developed it and included (21) questions about hazards of plastic containers on children health and type of safe and unsafe plastic containers. Scoring system: The mothers' knowledge was calculated for each item as follows: correct answer was scored (1point) while wrong

answer or did not know was scored (zero point). The total score for all questions related to knowledge was 21 points. Those who obtained less than (60% = 12 points) considered having unsatisfactory level. While those who obtained (60%) and more were considered having satisfactory level.

Part 3) Attitude of Children's Mothers toward hazards of plastic containers on children health (5 items), uses of plastic containers (11 items) and uses of plastic substitutes (3 items). the total number of items was 19. Scoring system: The responses of participants were measured on a three-point Likert scale (agree, uncertain and disagree). Items were respectively scored three, two and one for the responses. No negative items were present. Total score was 57 points; mothers' score of 60% and more was considered positive attitude while mothers' score less than 60% was considered negative attitude.

Part 4) Practice of Children's Mothers:

It consisted of the mothers' practices about using plastic containers and included 10 items. Scoring system: Each item categorized and scored into either done, or not done. For mothers' practice assessment "done" scored as one and if "not done" scored as zero. The total score of practices was 10 points. Those who obtained less than (60%= 6 points) were considered having improper level. While those who obtained (60%) and more considered having proper level.

Tool II: The educational program.

It was developed based on the children's mothers needs in a form of printed (Arabic booklet). It was also supplemented with information based on review of relevant literature (nursing textbook, journals, internet resources, etc.) about safe uses of plastic containers.

General objective of this program was to improve knowledge, attitude and practices of children's mothers about safe uses of plastic containers.

Specific objective of the program:

The program's specific objectives were that the mothers who attended the program should be able to:

- Summarize hazards of plastic containers on children health
- Recognize types of safe and unsafe plastic containers
- Appraise plastic symbols and what are the numbers represent within the recycle triangle.
- Apply safety precautions during uses of plastic containers.

Validity:

The five experts in the pediatric and community field of nursing and medical reviewed translated tools to ascertain their content validity and it was 97.6%.

2. Methods of Data Collection

An official letter approval was obtained from the Dean of Faculty of Nursing, to the Director of Assiut University Children Hospital and Ministry of Health in Sohag Governorate. This letter included a permission to carry out the study and explain the purpose and nature of the study. Meetings with outpatient clinics' manager to explain the objectives and contents of the program and the

methods for applying the program were help to gain their cooperation.

Pilot study:

It was carried out including on 10% (12 children's mothers) of the study sample to assess the tool clarity, applicability, and time needed to fill each sheet. The participants of the pilot study were excluded from the main study sample. **The reliability** was assessed in the pilot study and it was estimated by Alpha Cronbach's test for the tools and its result was R=0.883.

2.1. The Program Included Four Phases

2.1.1. Phase I (Preparatory Phase)

The actual fieldwork started from beginning of data was collected in the period from first of April 2018 to the end of November 2018. Investigators interviewed the children's mothers to explain the purpose of the study and reassure them that all data and results will be confidential. Pretest Arabic structured questionnaire was distributed in order to collect the required data. The researcher was available for more clarification whenever needed. The interview was carried out in the waiting area at the immunization clinic and it took about 15-20 minutes for each one.

2.1.2. Phase II (Program Planning)

The program was designed based on the identified needs of mothers. Children s' mothers were divided into small groups; each group involved 4 - 6 mothers.

Teaching time: The time of teaching sessions started at 9:00 Am until 11.30 Am.

Teaching place: The program conducted in sitting room that beside immunization clinic at Assiut University Children Hospital and MCH centers at Sohag.

2.1.3. Phase III (Program Implementation)

Educational program teaching was administered to each group in three sessions (lecture, demonstration and video showing) on the same day and each session lasted 45minutes. The 1st session, included, pretest and learning the mothers about hazards of plastic containers on children health and type of safe and unsafe plastic containers. The 2nd session included uses of plastic containers and plastic symbols and what are the numbers represent within the recycle triangle. The 3rd session included practices about safe using of plastic containers and immediate post-test. The program was presented in clear and concise form and different teaching methods, as illustrative lecture, group discussion, video-showing and demonstration were used. Each session usually started by a summary of what has been learned during the previous sessions and the objectives of the new topics. Feedback and reinforcement of teaching was performed according to the children s' mothers to ensure their understanding. Each children s' mother obtained a copy of the booklet that included all the training contents to facilitate the teaching of each topic.

2.1.4. Phase IV: (Program Evaluation)

In order to assess effectiveness of the intervention program, a post-test was done (immediately and after

2 months) using the same tool. Results of the post-test were compared to the pre-test results.

2.2. Ethical Considerations

All the relevant principles of ethics in research were followed. The pertinent authority approved the study protocol. Participants' formal consent to participate was obtained after informing them about their rights to participate, refuse, or withdraw at any time. Total confidentiality of any obtained information was ensured. The study questionnaire did not entail any harmful effects on participated children's mothers.

2.3. Statistical Design

The collected data was analyzed using Statistical Package for Social Science (SPSS) version 20. Descriptive and inferential statistics were calculated for socio-demographics, respondents' healthy practices while chi-square was used for inferential statistics of studied parameters. A probability level of 0.05 was adopted as a level of significance.

3. Results

Demographic characteristics of the studied children's mothers presents in [Table 1](#). It was noticed that 57.5 % of the studied mothers were in <30 years with mean age 29.00 ± 5.41 . More than half of the children's mothers were highly educated (university level) and coming from urban area (58.3% and 51.7%, respectively). As the table illustrated, 50.8% of mothers were homemakers and high percentage of them reported that main sources of their information about uses of safe plastic containers were internet and television (45% and 33.3%, respectively).

[Table 2](#) denotes to a sharp statistically significant rise of the percentage of all corrected items' knowledge of children's mothers about the safe use of plastic containers at immediate post-intervention ($p < 0.000$) compared to those at pre-intervention level. Although the percentage of most items of knowledge have declined at the follow-up phase (after 2 months), it was still statistically significantly higher than the pre- intervention level, $p < 0.000$. This improvement points to the effectiveness of the intervention program, which was successful in mothers' acquisition of knowledge.

[Table 3](#) compares the percentage of attitude items about the safe plastic containers uses among children's mothers throughout three phases (pre-intervention, post-intervention and follow-up after 2 months). There are significant differences between the two phases (pre and post intervention) of all attitude's items regarding hazards of plastic containers, plastic containers use and using of plastic substitute ($P < 0.002$). The comparison of two phases (pre-intervention and follow-up after 2 months) revealed that the percentage of agree item (indicates positive attitude) at follow-up significantly increase compared to the pre-intervention ($P < 0.003$). These positive findings may be related to the effectiveness of intervention program on mothers' attitude improvement.

[Table 4](#) indicates a statistically significant improvement was revealed in all items' practice that done by children's mothers regarding the safe plastic containers uses were higher at the post intervention (immediate and follow-up after 2months), compared to preprogram ($P < 0.000$). Regarding, item "Buy plastic colored toys without a symbol" there is no a significant difference between the pre/post and follow-up intervention ($P^1=0.704$ and $P^2=0.459$).

[Table 5](#) shows the comparison between mean score of knowledge, attitude and practice of children's mothers regarding the safe uses of plastic containers (pre, post and follow-up after 2 months). It indicates increases in the mean scores in all areas (knowledge, attitude and practice) at the post-intervention phase compared to pre-intervention. However, this increase reached statistical significance for the satisfactory knowledge, positive attitude and proper uses' percentages of children's mothers ($P = 0.000$). However, these scores have demonstrated some declines after two months at follow up testing. Nevertheless, the scores were still higher than the pre-intervention baseline scores

[Figure 1](#), illustrates a positive correlation between knowledge score and attitude score about the safe uses of plastic containers.

[Figure 2](#) reveals a positive correlation with a highly statistically significant correlation between knowledge and practice about the safe uses of plastic containers in pre and post-intervention program ($P < 0.001$).

Table 1. Distribution of demographic characteristics of children's mothers (n=120)

| | No. (120) | % |
|--|----------------------------|------|
| Mother age: (years) | | |
| < 30 | 69 | 57.5 |
| ≥ 30 | 51 | 42.5 |
| Mean ± SD (Range) | 29.00 ± 5.41 (21.0 – 43.0) | |
| No. of children: | | |
| 1 | 27 | 22.5 |
| 2 | 40 | 33.3 |
| 3 | 29 | 24.2 |
| 4 or more | 24 | 20.0 |
| Residence: | | |
| Rural | 58 | 48.3 |
| Urban | 62 | 51.7 |
| Mother education: | | |
| Read & write | 12 | 10.0 |
| Secondary | 38 | 31.7 |
| University | 70 | 58.3 |
| Mother occupation: | | |
| Housewife | 61 | 50.8 |
| Working | 59 | 49.2 |
| Source of information about uses of safe plastic containers | | |
| Relatives | 22 | 18.3 |
| School | 31 | 25.8 |
| Internet | 54 | 45.0 |
| Television | 40 | 33.3 |

Table 2. Distribution of the correct knowledge of children's mothers about the safe using of plastic containers throughout pre / post intervention phases (immediate and follow-up after 2 months)

| Items | Pre-test | | Immediate | | After 2 m | | P-value ¹ | P-value ² |
|--|----------|------|-----------|-------|-----------|------|----------------------|----------------------|
| | No. | % | No. | % | No. | % | | |
| Did you know that there is a safe plastic and another hazardous? | 65 | 54.2 | 114 | 95.0 | 114 | 95.0 | 0.000* | 0.000* |
| Do you have information about plastic hazards? | 44 | 36.7 | 118 | 98.3 | 115 | 95.8 | 0.000* | 0.000* |
| Do you watched a program or searched for information about plastic hazards? | 20 | 16.7 | 108 | 90.0 | 113 | 94.2 | 0.000* | 0.000* |
| Is there a symbol indicating the type of plastic below the packaging? | 0 | 0.0 | 115 | 95.8 | 100 | 83.3 | 0.000* | 0.000* |
| Do you know the types plastic and their symbols? | 30 | 25.0 | 120 | 100.0 | 113 | 94.2 | 0.000* | 0.000* |
| Is there any plastic symbol on the infant's bottle feeding? | 27 | 22.5 | 120 | 100.0 | 112 | 93.3 | 0.000* | 0.000* |
| Mention the safe number below it | 33 | 27.5 | 98 | 81.7 | 87 | 72.5 | 0.000* | 0.000* |
| Is there any plastic symbol on your infant's or child's toys? | 8 | 6.7 | 98 | 81.7 | 99 | 82.5 | 0.000* | 0.000* |
| Mention the safe number below them | 43 | 35.8 | 118 | 98.3 | 109 | 90.8 | 0.000* | 0.000* |
| Is there any plastic symbol on your child's food storage container? | 41 | 34.2 | 115 | 95.8 | 106 | 88.3 | 0.000* | 0.000* |
| Mention the safe number | 37 | 30.8 | 108 | 90.0 | 104 | 86.7 | 0.000* | 0.000* |
| Is there any plastic symbol on your child's food dishes? | 36 | 30.0 | 101 | 84.2 | 97 | 80.8 | 0.000* | 0.000* |
| Mention the safe number | 91 | 75.8 | 120 | 100.0 | 114 | 95.0 | 0.000* | 0.000* |
| Do you know that there a difference in the prices of safe and unsafe plastic containers? | 95 | 79.2 | 107 | 89.2 | 107 | 89.2 | 0.000* | 0.000* |
| Did colored plastic bags use for transporting and handling bread | 25 | 20.8 | 95 | 79.2 | 81 | 67.5 | 0.000* | 0.000* |
| Do you know that bottled water should be used to drink baby once? | 56 | 46.7 | 106 | 88.3 | 109 | 90.8 | 0.000* | 0.000* |
| Do you know that hot foods of child should not placed in plastic dishes? | 45 | 37.5 | 106 | 88.3 | 109 | 90.8 | 0.000* | 0.000* |
| Do you know that child's food should not be kept in plastic dishes in the refrigerator? | 99 | 82.5 | 120 | 100.0 | 118 | 98.3 | 0.000* | 0.000* |
| Do you know that plastic utensils should not be used for heating foods in the microwave? | 73 | 60.8 | 109 | 90.8 | 102 | 85.0 | 0.000* | 0.000* |
| Do you know that plastic cups utensils should not be used for hot drinks? | 25 | 20.8 | 95 | 79.2 | 91 | 75.8 | 0.000* | 0.000* |

Table 3. Distribution of Attitude items about the safe plastic containers uses among children's mothers at pre / post intervention phases (immediate and follow-up after 2 months)

| Items | Pre-test | | | Immediate | | | After 2 m | | | P-value ¹ | P-value ² |
|--|----------|------|------|-----------|------|------|-----------|------|------|----------------------|----------------------|
| | A | N | D | A | N | D | A | N | D | | |
| A. Mothers tend to hazards of plastic food containers | % | % | % | % | % | % | % | % | % | | |
| I think plastic containers are hazardous to children | 40.8 | 18.3 | 40.8 | 65.8 | 10.0 | 24.2 | 61.7 | 11.7 | 26.7 | 0.001* | 0.003* |
| I think plastic is safe and other risks while using it | 39.2 | 27.5 | 33.3 | 87.5 | 1.7 | 10.8 | 85.8 | 1.7 | 12.5 | 0.000* | 0.000* |
| I think plastic containers are non-biodegradable so it is dangerous. | 34.2 | 31.7 | 34.2 | 76.7 | 4.2 | 19.2 | 71.7 | 6.7 | 21.7 | 0.000* | 0.000* |
| I think putting hot food / drink in plastic container is dangerous because it interacts with food | 45.8 | 27.5 | 26.7 | 79.2 | 4.2 | 16.7 | 77.5 | 5.0 | 17.5 | 0.000* | 0.000* |
| I think the interaction of food with unauthorized plastic substances causes many disease | 40.0 | 31.7 | 28.3 | 83.3 | 2.5 | 14.2 | 80.0 | 5.0 | 15.0 | 0.000* | 0.000* |
| B. Mothers tend to use plastic containers: | | | | | | | | | | | |
| According to me, the plastic bag does not keep the food refrigerated | 39.2 | 30.0 | 30.8 | 66.7 | 16.7 | 16.7 | 60.8 | 20.0 | 19.2 | 0.000* | 0.001* |
| I think the fatty substances is the most interactive food with the chemical in plastics | 25.8 | 30.0 | 44.2 | 67.5 | 11.7 | 20.8 | 67.5 | 12.5 | 20.0 | 0.000* | 0.000* |
| I think unknown plastic products will create different diseases in humans | 38.3 | 28.3 | 33.3 | 79.2 | 2.5 | 18.3 | 75.8 | 3.3 | 20.8 | 0.000* | 0.000* |
| I think the symbols below the infant's bottle-feeding is important. | 49.2 | 25.0 | 25.8 | 70.0 | 9.2 | 20.8 | 67.5 | 9.2 | 23.3 | 0.000* | 0.001* |
| According to me, the lack of signs below the infant's bottle feeding means that they are anonymous and dangerous | 37.5 | 24.2 | 38.3 | 76.7 | 5.8 | 17.5 | 75.0 | 5.8 | 19.2 | 0.000* | 0.000* |
| According to me, changes in the color or smell of the infant's bottle feeding means it is not safe. | 51.7 | 25.8 | 22.5 | 83.3 | 3.3 | 13.3 | 77.5 | 6.7 | 15.8 | 0.002* | 0.002* |
| I think cheap infant's bottle feeding with low quality is very dangerous | 33.3 | 29.2 | 37.5 | 82.5 | 2.5 | 15.0 | 80.0 | 4.2 | 15.8 | 0.000* | 0.000* |
| I think the symbol below the infant's food dishes is important. | 32.5 | 28.3 | 39.2 | 84.2 | 4.2 | 11.7 | 81.7 | 5.0 | 13.3 | 0.000* | 0.000* |
| According to me, the symbol below the infant's toys is important. | 30.0 | 25.0 | 45.0 | 83.3 | 5.8 | 10.8 | 78.3 | 8.3 | 13.3 | 0.000* | 0.000* |
| I think heating, freezing and keeping food in plastic containers of unknown origin is very dangerous. | 37.5 | 28.3 | 34.2 | 81.7 | 6.7 | 11.7 | 77.5 | 9.2 | 13.3 | 0.000* | 0.000* |
| According to me, bottled water is only valid once | 35.8 | 31.7 | 32.5 | 86.7 | 2.5 | 10.8 | 81.7 | 4.2 | 14.2 | 0.000* | 0.000* |
| Mothers tend to use plastic substitute: | | | | | | | | | | | |
| Do you support the idea of replacing plastic bag by those made of cloth or paper? | 29.2 | 30.8 | 40.0 | 83.3 | 5.8 | 10.8 | 79.2 | 8.3 | 12.5 | 0.000* | 0.000* |
| Do you support the idea of replacing plastic bottles with glass bottles? | 34.2 | 29.2 | 36.7 | 73.3 | 11.7 | 15.0 | 69.2 | 14.2 | 16.7 | 0.000* | 0.000* |
| Do you support the idea of replacing plastic containers by those made of pottery? | 28.3 | 32.5 | 39.2 | 82.5 | 6.7 | 10.8 | 79.2 | 8.3 | 12.5 | 0.000* | 0.000* |

*A=agree, N= neutral, D= disagree.

Table 4. Distribution of practices done by children's mothers regarding the safe uses of plastic containers at pre / post intervention phases (immediate and follow-up after 2 months)

| Items | Pre-test | | Immediate | | After 2 m | | P-value ¹ | P-value ² |
|--|----------|------|-----------|------|-----------|------|----------------------|----------------------|
| | No. | % | No. | % | No. | % | | |
| Look below the plastic container when you buy it. | 12 | 10.0 | 112 | 93.3 | 117 | 97.5 | 0.000* | 0.000* |
| Buy unsafe plastic containers because of their cheap prices | 118 | 98.3 | 81 | 67.5 | 83 | 69.2 | 0.000* | 0.000* |
| *Buy a plastic container without a symbol. | 108 | 90.0 | 78 | 65.0 | 85 | 70.8 | 0.000* | 0.000* |
| *Use bottle feeding for the child does not have any symbols | 115 | 95.8 | 90 | 75.0 | 77 | 64.2 | 0.000* | 0.000* |
| Replace infant bottle formula with baby if it changes in color or smell | 92 | 76.7 | 118 | 98.3 | 118 | 98.3 | 0.000* | 0.000* |
| *Keep food inside the refrigerator in plastic containers with no symbols | 114 | 95.0 | 96 | 80.0 | 91 | 75.8 | 0.000* | 0.000* |
| *Put hot food in plastic containers with no symbols | 85 | 70.8 | 48 | 40.0 | 40 | 33.3 | 0.000* | 0.000* |
| *Use natural water bottles more than once | 97 | 80.8 | 63 | 52.5 | 65 | 54.2 | 0.000* | 0.000* |
| *Buy plastic colored toys without a symbol | 105 | 87.5 | 103 | 85.8 | 101 | 84.2 | 0.704 | 0.459 |
| check plastic food container to know safe symbols | 75 | 62.5 | 113 | 94.2 | 104 | 86.7 | 0.000* | 0.000* |

(*) Negative statement.

Table 5. Comparison between pre-post intervention (immediate and follow-up after 2months) mean scores knowledge, attitude and practice regarding the safe uses of plastic containers

| | Pre-test (n= 120) | | Immediate (n= 120) | | After 2 m (n= 120) | | P-value ¹ | P-value ² |
|------------------------|----------------------|------|-----------------------|------|-----------------------|------|----------------------|----------------------|
| | No. | % | No. | % | No. | % | | |
| Knowledge level | | | | | | | | |
| Unsatisfactory | 109 | 90.8 | 4 | 3.3 | 10 | 8.3 | 0.000* | 0.000* |
| Satisfactory | 11 | 9.2 | 116 | 96.7 | 110 | 91.7 | | |
| Mean ± SD | 8.12 ± 4.27 | | 18.79 ± 2.28 | | 17.9 ± 2.35 | | 0.000* | 0.000* |
| Attitude level | | | | | | | | |
| Negative | 54 | 45.0 | 7 | 5.8 | 9 | 7.5 | 0.000* | 0.000* |
| Positive | 66 | 55.0 | 113 | 94.2 | 111 | 92.5 | | |
| Mean ± SD | 38.56 ± 12.02 | | 46.82 ± 10.86 | | 45.22 ± 11.33 | | 0.000* | 0.000* |
| Practice level | | | | | | | | |
| Improper use | 115 | 95.8 | 89 | 74.2 | 95 | 79.2 | 0.000* | 0.000* |
| Proper use | 5 | 4.2 | 31 | 25.8 | 25 | 20.8 | | |
| Mean ± SD | 2.79 ± 1.48 | | 6.47 ± 1.40 | | 6.49 ± 1.39 | | 0.001* | 0.000* |

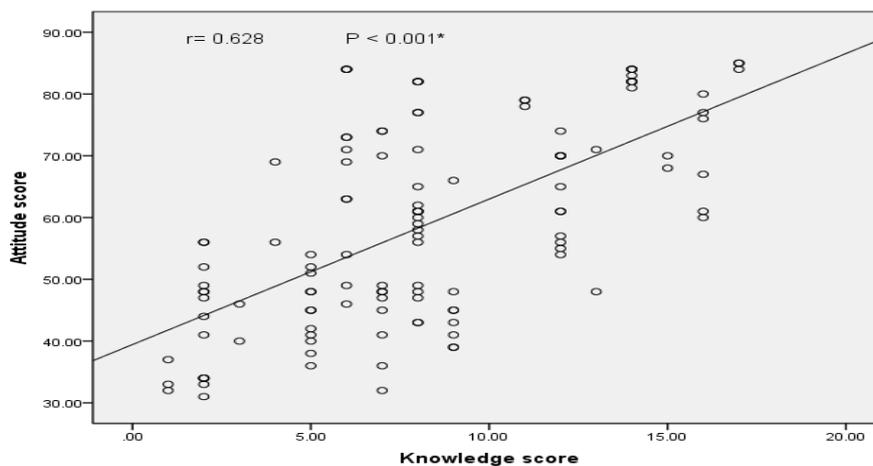


Figure 1. Correlation between knowledge and attitude score about the safe use of plastic containers

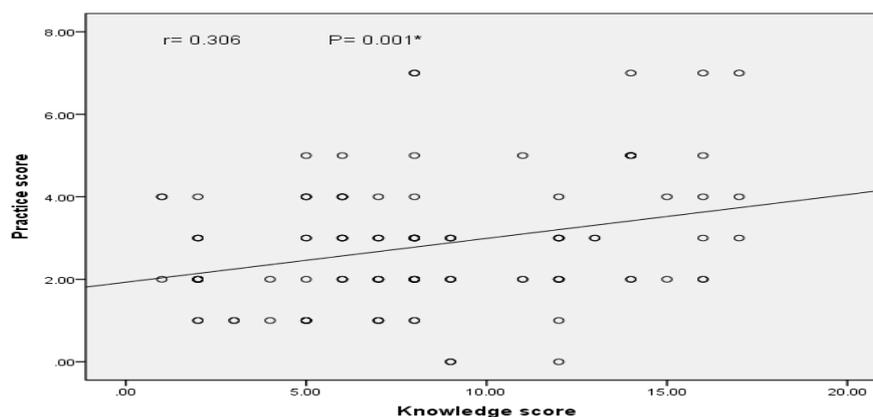


Figure 2. Correlation between knowledge score and practice score

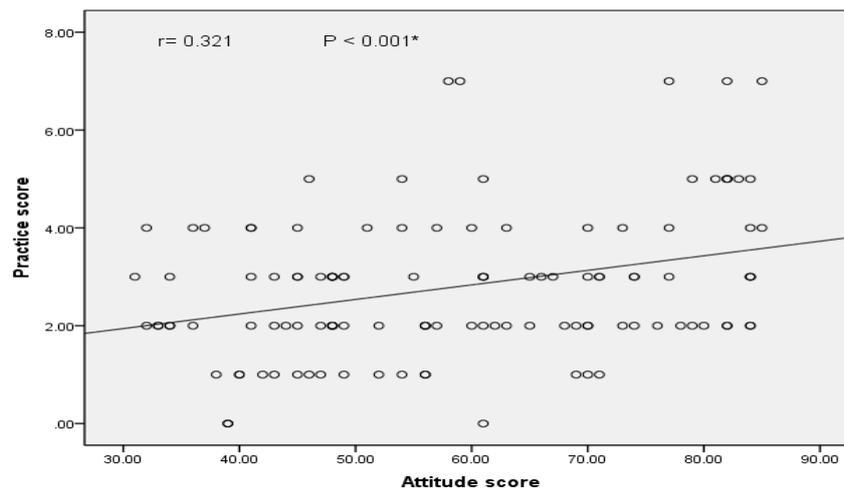


Figure 3. Correlation between practice score and attitude score

Table 6. Relationship between mean scores' knowledge, attitude and practice regarding the safe uses of plastic containers and demographic characteristics

| | Knowledge score | P-value | Attitude score | P-value | Practice score | P-value |
|----------------------------|-----------------|---------|----------------|---------|----------------|---------|
| | Mean ± SD | | Mean ± SD | | Mean ± SD | |
| Residence: | | | | | | |
| Rural | 6.24 ± 3.76 | 0.000* | 49.69 ± 11.04 | 0.000* | 2.48 ± 1.34 | 0.027* |
| Urban | 9.87 ± 3.99 | | 66.85 ± 15.55 | | 3.08 ± 1.56 | |
| Mother age: (years) | | | | | | |
| < 30 | 6.72 ± 3.46 | 0.000* | 54.07 ± 14.14 | 0.000* | 2.42 ± 1.22 | 0.001* |
| ≥ 30 | 10.00 ± 4.57 | | 64.63 ± 16.53 | | 3.29 ± 1.66 | |
| Mother education: | | | | | | |
| Read & write | 5.00 ± 1.95 | 0.000* | 53.33 ± 12.03 | 0.000* | 3.08 ± 1.16 | 0.039* |
| Secondary | 5.11 ± 3.57 | | 44.05 ± 8.96 | | 2.29 ± 1.23 | |
| University | 10.29 ± 3.55 | | 67.33 ± 13.33 | | 3.01 ± 1.60 | |
| Mother occupation: | | | | | | |
| Housewife | 6.75 ± 4.26 | 0.000* | 52.38 ± 13.94 | 0.000* | 2.67 ± 1.46 | 0.372 |
| Working | 9.53 ± 3.84 | | 64.95 ± 15.61 | | 2.92 ± 1.51 | |

The correlation between practice and attitude scores of children's mothers regarding the safe uses of plastic containers is portaged in Figure 3. It obvious that the more mother' knowledge score increase, the positive attitude increase with a statistically significant difference ($P < 0.001$, $R = 0.321$).

Table 6 shows the relation between mean scores' knowledge, attitude and practice regarding the safe uses of plastic containers and demographic characteristics of studied children's mothers. It was found that, there is a statistical significant relationship between the mean scores' knowledge, attitude and practice of children's mothers and their age ($P < 0.001$) [i.e. the mother's age increase, the mean scores increase]. Also, it is clear from the same table that, the urban children's mothers with highly education had high mean scores' knowledge, attitude and practices regarding the safe plastic containers uses with statistically significant difference ($P < 0.039$). On the other hand, there is no significant difference between mean scores' practices and mothers' occupation ($P = 0.372$).

4. Discussion

The findings of the current study found that the high percentages of the participant mothers were thirty years

and above and about two thirds of them came from urban. This is may be related to the study's settings presented in the city. In addition, children's mothers reported that internet and television were main sources of their information about uses of safe plastic containers. An explanation for this comes from the results of the current study, which found that nearly two thirds of the mother had university level education. Moreover, this is evident that internet and television is important means to enable easy availability of information. Srinivasan and Swarnapriya [12] supported this finding and reported that Radio and Television can be used in mass dissemination of information about safe uses of plastic and waste management practice.

Plastic became included in our today's life activity. Therefore, the first aim of this study was assessing the basic knowledge, attitude and practice of children's mothers regarding the safe use of plastic. It revealed that, the majority of the children's mother had unsatisfactory knowledge level about the safe use of plastic containers and had improper practices related to safe use of plastic about half of them had negative attitude. Add to that, about half of them had negative attitude regarding the safe use of plastic containers. Kasemsup, and Neesanon [8] studied the knowledge relating to plastic containers among 100 parents and found that, 80% of participants had

inadequate knowledge they do not know how to use plastics properly. In the same line, Kaur et al., [12] studied knowledge about plastic health hazards among thirty participants and found that, at pre-test 60% of them had poor knowledge and none of them had good knowledge.

The present study's results found that mean score of knowledge significantly increased at post intervention and follow-up after 2 months in comparison to pre-intervention score (18.79 ± 2.28 and 17.9 ± 2.35 , 8.12 ± 4.27 , respectively). The mothers' acquisition of knowledge is evidence of the effectiveness of the intervention program. Similarly, Kaur et al., [12] studied knowledge about plastic health hazards among thirty participants and reported that after intervention of structured teaching program, 40% of them had good knowledge and 60% of them had average knowledge hazards of plastic use. They concluded that, structured teaching regarding health program is effective in increasing knowledge of participants regarding use of plastic.

In contrast to the current study findings, Vigneshwaran and Arun kumar [4] studied the knowledge, attitude and practice on plastic usage among the residents of Tiruchirappalli Municipal Corporation, Tamil Nadu, India. They found that, in the overall dimension that more than half (51.7%) of the respondents showed high-level knowledge, attitude and practice on plastic usage. Exactly three fourth (75%) of the respondents perceived high level on plastic usage in the dimension of knowledge. (56.7%) of the respondents showed high level on plastic usage in the dimension of attitude and the majority (83.3%) of the respondents showed high level on plastic usage in the dimension of practice. This may be explained by that India is the country that produced enormous amount of plastic products and waste so people in India have high basic level of awareness knowledge, attitude and practice.

On studying the relation between of children's mothers knowledge, attitude and practice of children's mothers regarding the safe use of plastic and their personal characteristics, the present study answers exposed the total knowledge, attitude and practice's scores were significantly increase as age increases. This finding reinforced by the recent study [12] which found a significant relationship between the respondent's age and Knowledge, Attitude and Practice (KAP) on plastic usage. In addition, the level of knowledge, attitude and practice of children's mother had a direct relationship with their education level. This finding is congruent with Al-Khatib, et al., [13] who clarified a significant association of age with knowledge regarding health hazards of plastic use among students.

The effect of interventional program on knowledge, attitude and practice of children's mothers regarding the safe use of plastic was the second dimension that explored in this study. After implementation of the program, statistically significant raising were shown in their knowledge, changes their attitude and modifying actual practice of the safe use of plastic products. Moreover, the mean score after the education program were increased in comparing between pre-test and post-test and the p-value of t-test was very highly significant. These findings indicate success of the program in realizing the research hypotheses. This success firstly can be attributed to choice children's mothers as suitable target population (i.e. mothers who would eventually buy feeding bottles,

toys....etc for their children). In addition, the interventions program based on interactive approaches can be useful and applicable for behavior modification.

In agreement with these findings, the study done by Kaur et al., [12] who studied knowledge about plastic health hazards among thirty participants and found that, at pre-test mean pretest knowledge score was 7.9 and after intervention of structured teaching program, knowledge score was 19.2 with statistically significant difference ($P=0.01$). Similar results reached by Manuel, et al., [14] who reported there was positively influenced by educational intervention out of 59 participants. Their result revealed that participants' attitude scores increased from 114 to 122 ($p < \text{or} = .001$) and knowledge from 11 to 13 ($p < \text{or} = .001$).

In the present study, there was a decline in mean scores of satisfactory knowledge, positive attitude and proper practice among children's mothers in the follow-up phase after 2 months that is a normal and expected finding. This decline could be rises from the retained of knowledge gained with time, limited financial resources and easy availability and low cost of plastic products and lack of easy access to substituted of plastic ones. However, they remained high, compared to pre-program levels. Kasemsup and Neesanan [8] demonstrated a similar observation, concluded that, parents are aware of health effects of plastic containers, but they do not know how to use plastics properly.

Regarding integrating among knowledge, attitude and practice of children's mothers about the safe use of plastic, the present study has demonstrated statistically significant associations between knowledge score and attitude score, knowledge score and practice and practice score and attitude. This finding is quite expected and is congruence with previous studies have been conducted on the knowledge, attitude, and practice. Bortoleto et al., [15] believed that the knowledge of individuals is recognized as an important and influential factor in practices. Recently, Srinivasan & Swarnapriya, [16] found that there was a positive correlation found between the knowledge and practice and reported that having significant knowledge on a particular subject will definitely have an influence on one's attitude towards it.

Finally, Strengths in this study included multi-center study (Assiut and Sohag) with reasonable number of cases. Add to that, it can be considered as a basis for more comprehensive studies about uses of plastic. As with any research, there are certain limitations of the study firstly, the absence of a comparative group. Secondly, all possible efforts were made to standardize the educational intervention; it is possible that environmental factors such as differences in the abilities of participants and their ability to disseminate study messages affected the outcome of the study.

5. Conclusion

The study findings lead to the conclusion that majority of children's mothers had unsatisfactory knowledge and improper practice regarding the safe use of plastic. Implementation of the intervention program based on assessment of children's mothers needs led to statistically

significant improvements in their knowledge, attitude and practice. Hence, the program was successful in achieving its goals. The study findings reveal that there is the great positive relationship among the knowledge, attitude and practice about the safe use of plastic.

6. Recommendations

- All the health care providers such as nurses and midwives, village health guides, nurses working in community center, schools should provide in-service education regarding safe use of plastics
- Pamphlets, posters or handbills on safe using of plastic can be displayed up at schools, outpatient clinics, MCH, university, and near the cash counters in supermarkets.
- Future scope to minimize plastic use and increase awareness on the using of plastic substitutes like paper and cloth.

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