Digital Humanities, Social Science and Cultural Preservation

PRIME OPEN ACCESS

Volume 1, Issue 1

Research Article

Date of Submission: 03 March, 2025
Date of Acceptance: 11 April, 2025
Date of Publication: 30 April, 2025

The Effect of Bisphenol a Training on the Knowledge Levels of Women: A Quasi-Experimental Study

Mustafa Kilavuz[1*] and Refika Genc Koyucu[2]

[1]Adıyaman University Faculty of Health Sciences Department of Nursing Kampüsü, Adıyamanl, Turkey

[2]Istinye University Faculty of Health Sciences Department of Midwifery Topkapı Kampüsü, Istanbul, Turkey

***Corresponding Author:**
Mustafa Kilavuz, Adıyaman University Faculty of Health Sciences Department of Nursing Kampüsü, Adıyamanl, Turkey.

Citation: Kilavuz, M., Koyucu, R. G. (2025). The Effect of Bisphenol a Training on the Knowledge Levels of Women: A Quasi-Experimental Study. *Digit Hum Soc Sci Cult Preserv, 1*(1), 01-08.

Abstract
Exposure to Bisphenol A which is a chemical degradant has increased especially in industrialized societies. Bisphenol A has many negative effects on women's reproductive health. Women cannot know the negative effects of Bisphenol A without knowing what it is. The aim of this study is to examine the effect of Bisphenol A training provided to women on their level of knowledge. The data were collected from women with a mean age of 28 ± 4 years in 3 stages. Among the participants, 87.1% had not received information about Bisphenol A before. After the training provided to the women, the rate of paying attention to Bisphenol A-containing substances increased statistically ($p<0.05$). These findings indicate that as women's level of knowledge about Bisphenol A increases, their plastic use decreases and their level of attention increases.

Keywords: Bisphenol A, Women Health and Reproductive Health

Introduction
Bisphenol A (BPA) is an endocrine-disrupting chemical widely used in the production of polycarbonate plastics, epoxy resins and thermal papers [1]. Endocrine-disrupting chemicals can interfere with the physiological effects of estrogen, androgen and thyroid hormones by acting as hormone agonists and antagonists when they accumulate in the body [2]. BPA is classified as an environmental estrogen. It is a human-made and non-steroidal chemical entering the body through adsorption or digestion and binding to estrogen receptors and mimics estrogenic activities [3]. The human population is exposed to BPA through different pathways and sources, but diet has been confirmed to be the primary source of exposure to Bisphenol A (BPA). Consumption of canned food has been reported to be a significant contributor to BPA exposure. BPA is frequently contained in canned foods and the level of contamination is significantly higher than in non-canned foods (e.g., fresh, frozen, and plastic packaging) [4,5].

According to the findings of in vitro and animal studies, potential effects of BPA exposure on human health may include reduced fertility due to impaired oocyte maturation, E2 suppression and early pregnancy loss due to chromosomal abnormalities [6]. Besides, recent epidemiologic studies have indicated that BPA potentially be associated withchanges in hormone levels, impaired ovarian and uterine functionand reduced sperm quality.Available data from experimental studies suggest that exposure to BPA in animal models adversely affects oocyte quality and maturation, reduces sperm production and quality, damages testicular cells, disrupts hormone levels, and impairs ovarian function and uterine morphology [7,8].This study aims to examine the effect of bisphenol A training provided to women on their level of knowledge.

Materials and Methods
Study Design
This research was conducted as a pretest-posttest quasi-experimental study. The research was approved by the ethics

committee of the university (Ethics protocol no: 22-168). It was conducted in accordance with the Declaration of Helsinki. The research data were collected face-to-face.

Participants
The participants of the research consisted of female academic and administrative staff working at a foundation university. Literate women over the age of 18 were included in the study. Exclusion criteria were defined as involuntary participation in the study, being under 18 years of age and being male.

Analysis
The data were created by the researchers through the review of the literature and the first 6 questions were prepared under the title of "The Effect of Bisphenol A Training on the Knowledge Levels of Women" and the other questions related to descriptive information included 15 questions about whether women consciously use the substance containing Bisphenol A among the tools and equipment they use in daily life. It consisted of 21 questions in total and was used as a questionnaire related to Bisphenol A.

Stages of Data Collection
The sample was selected in accordance with the selection criteria and the data were collected by applying pre-test, training and post-test to the women accepted to the research group.

First Stage
The women were met and informed about the aim of the study and the program to be implemented. Afterward, written and verbal consent was obtained from the women and a questionnaire about Bisphenol A including descriptive questions was filled in.

Second Stage
Before the appointment time, the women were met in the training room prepared by the researchers. The training on "The Effect of Bisphenol A Training on the Knowledge Levels of Women"lasted approximately 40 minutes. Following the training, the questionnaire on Bisphenol A, including descriptive questions, was filled in again.

Third Stage
One month after the training, a questionnaire about Bisphenol A, including descriptive questions, was filled in by the women.

Topics of the Training
- Definitions of Bisphenol A.
- The effects of Bisphenol A on women's health.
- The effects of Bisphenol A on children's health.
- Ways to Protect from Bisphenol A.

Population Sample Calculation
The population of the study consists of female academic and administrative staff working at a university and female students studying at a university.

Sample Selection
The number of women working and studying at the institution where the research would be conducted in 2022 was determined as 7562 in total. Since this study was designed as a quasi-experimental study, power analysis was conducted in order to determine the number of people to be included in each group. When the sample size was calculated using the G*Power (3.0.10) program with 80% power, 0.05 margin of error and 0.5 effect level, it was determined that at least 64 women were required to be included for each of the experimental and control groups. Considering the possibility of data loss during the research process, it was deemed appropriate to include 70 women in both groups.

Data Analysis
The data obtained within the scope of the research were evaluated with SPSS for Windows (Version 24.0, Statistical Package for Social Sciences) program. The compatibility of the data with normal distribution was evaluated through Kolmogorov-Smirnov test and it was observed that the data were not compatible with normal distribution. Descriptive statistics of continuous variables in the study are presented with mean, standard deviation and median values, and descriptive statistics of categorical variables are presented with frequency and percentage. Pearson Chi-Square test and Fisher's Exact test were applied for group comparisons of categorical variables. Bonferroni correction test was applied to determine which groups were responsible for the intergroup differences. The obtained data were evaluated at a confidence interval of 95% and a significance level of $p<0.05$.

Results

Characteristics	Mean ± SD	Median
Age	28 ±4	28
Characteristics	n	%
Educational Level		
Illiterate	2	2,9
Primary school	6	8,6
High school	5	7,1
Undergraduate Degree	57	81,4
Level of Income		
Income less than expenses	15	21,4
Income equal to expenses	48	68,6
Income higher than expenses	7	10
Family Type		
Nuclear family	61	87,1
Extended family	9	12,9
Number of Children		
None	57	81,4
1	3	4,3
2	6	8,6
3 and more	4	5,7
Relationship Status		
I have a partner	28	40
I don't have a partner	42	60
Previous Information About Bisphenol A		
Yes	9	12,9
No	61	87,1
Source of Information*		
Magazine/Newspaper/Book	1	1,4
School	3	4,3
Family/Friend	5	7,1
Social media	2	2,9
Healthcare Professionals	1	1,4
*More than one answer given		

Table 1: Distribution of Sociodemographic Characteristics of Women

Table 1 indicates the distribution of sociodemographic characteristics of the women who participated in the study and their status of information about Bisphenol. It was determined that the mean age of the women was 28±4 years, the majority had a bachelor's degree (81.4%), their income was equal to their expenses (68.6%), and they had a nuclear family structure (87.1%), 81.4% did not have children, 60% did not have a partner, and the majority did not know about Bisphenol (87.1%) (Table 1).

	Before Training				*One Week After Training*				*One Month After Training*				*Statistics*	
	Yes		*No*		*Yes*		*No*		*Yes*		*No*			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*χ2*	*p*
Status of Product Use														
Plastic Cups	*70a*	*100*	*0a*	*0*	*56 b*	*80*	*14 b*	*20*	*22c*	*31*	*48 c*	*68, 6*	*83,67 0*	*<0,00 1*
Plastic Bottle	*70a*	*100*	*0a*	*0*	*56 b*	*80*	*14 b*	*20*	*31c*	*44*	*39 c*	*55, 7*	*59,10 6*	*<0,00 1*
Plastic Utensils	*70a*	*100*	*0a*	*0*	*51 b*	*72, 9*	*19 b*	*27 ,1*	*40b*	*57*	*30 b*	*42, 9*	*36,78 8*	*<0,00 1*

Plastic Utensils	70a	100	0a	0	51 b	72, 9	19 b	27 ,1	40b	57	30 b	42, 9	36,78 8	<0,00 1
Containers Made of Artificial Foam	70a	100	0a	0	15 b	21, 4	55 b	78 ,6	10b	14	60 b	85, 7	127,8 26	<0,00 1
Plastic Container	70a	100	0a	0	53 b	75, 7	17 b	24 ,3	40b	57	30 b	42, 9	37,22 5	<0,00 1
Considered Behaviors														
We should not put plastic containers	19a	27,1	51a	72, 9	53 b	75, 7	17 b	24 ,3	57b	81	13 b	18, 6	52,57 5	<0,00 1
in the fridge														
We should not consume water in plastic bottles left in the car	57	81,4	13	18, 6	61	87, 1	9	12 ,9	63	90	7	10	2,240	0,326
We should immediately empty the water from the carboys into a glass container	15a	21,4	55a	78, 6	39 b	55, 7	31 b	44 ,3	49b	70	21 b	30	34,90 8	<0,00 1
We should use glass feeding bottle	33a	47,1	37a	52, 9	56 b	80	14 b	20	57b	81	13 b	18, 6	24,85 7	<0,00 1
Plastic cups and stirrers for hot tea, coffee and other liquids should be banned	45	64,3	25	35, 7	49	70	21	30	55	79	15	21, 4	3,512	0,173
We should not put plastic containers in the microwave oven	46a	65,7	24a	34, 3	60 b	85, 7	10 b	14 ,3	65b	93	5b	7,1	18,32 7	<0,00 1
Plastic containers should not be washed in the dishwasher	42a	60	28a	40	56 b	80	14 b	20	56b	80	14 b	20	9,545	0,008
Plastics should not be washed with harsh detergents	11a	15,7	59a	84, 3	46 b	65, 7	24 b	34 ,3	52b	74	18 b	25, 7	56,12 0	<0,00 1
Glass bottles and containers should	38a	54,3	32a	45, 7	52 b	74, 3	18 b	25 ,7	55b	79	15 b	21, 4	11,00 7	0,004
be used for the consumption of food														
Are you careful about using plastic containers?	35a	50	35a	50	57 b	81, 4	13 b	18 ,6	66b	94	4b	5,7	39,00 4	<0,00 1
What kind of kitchen utensils do you use when heating water?													95,05 0	<0,00 1
Steel Teapot	33a	47,1	-	-	35 a	50	-	-	31a	44	-	-		
Porcelain Teapot	0a	0	-	-	29 b	41, 4	-	-	37b	53	-	-		
Plastic Kettle	9a	12,9	-	-	6a	8,6	-	-	2a	2, 9	-	-		

Steel Kettle	28a	40	-	-	0b	0	-	-	0b	0	-	-		
How do you store fruits and vegetables in the fridge?													36,498	<0,001
I store them in plastic containers	14a	20	-	-	2b	2,9	-	-	6b	8,6	-	-		
I store them in plastic bags	36a	51,4	-	-	26b	37,1	-	-	14b	20	-	-		
I store them in glass containers	16a	22,9	-	-	35b	50	-	-	34b	49	-	-		
I store them in paper bags	4a	5,7	-	-	7b	10	-	-	16b	23	-	-		
What do you think about the use of plastic bags?													50177*	<0,001
The use of plastic bags definitely cause no harm to our health	3a	4,3	-	-	1a	1,4	-	-	0a	0	-	-		
Mesh bags should be used instead of plastic bags	29a	41,4	-	-	39a,b	55,7	-	-	44b	63	-	-		
It does not matter if you use plastic bags or not	33a	47,1	-	-	8b	11,4	-	-	4b	5,7	-	-		
Mesh bags must be used	5a	7,1	-	-	22b	31,4	-	-	22b	31	-	-		
Do you think that plastic makes your life easier?	62a	88,6	8a	11,4	56a,b	80	14a,b	20	50b	71	20b	28,6	6,429	0,04
Do you use a plastic cutting board?	32a	45,7	38a	54,3	18b	25,7	52b	74,3	11b	16	59b	84,3	15,850	<0,001
What do you think about using plastic food containers in microwave ovens?													13470*	0,01
Plastic food containers should not be used in microwave ovens	57a	81,4	-	-	66a	94,3	-	-	66a	94	-	-		
There is no problem using plastic food containers in the microwave oven	1a	1,4	-	-	0a	0	-	-	1a	1,4	-	-		
We can use plastic food containers according to the degree and duration of the microwave oven	3a	4,3	-	-	2a	2,9	-	-	3a	4,3	-	-		
I am undecided about this issue	9a	12,9	-	-	2a,b	2,9	-	-	0b	0	-	-		
What do you think about canned food? Should it be consumed?														

Canned food should be consumed, they are very useful for food preparation	*11a*	*15,7*	*-*	*-*	*1b*	*1,4*	*-*	*-*	*2b*	*2,9*	*-*	*-*	*32399**	*<0,001*
The consumption of canned foods should be reduced for our health	*21a*	*30*	*-*	*-*	*30a*	*42,9*	*-*	*-*	*30a*	*43*	*-*	*-*		
I am undecided about the consumption of canned food, but if we need it very much, it should be consumed.	*31a*	*44,3*	*-*	*-*	*18a,b*	*25,7*	*-*	*-*	*13b*	*19*	*-*	*-*		
Canned foods should never be consumed	*7a*	*10*	*-*	*-*	*21b*	*30*	*-*	*-*	*25b*	*36*	*-*	*-*		
If you have had dental prostheses or dental crowns, have you checked whether they contain Bisphenol A?													*130,281*	*<0,001*
Yes, I paid utmost attention	*0a*	*0*	*-*	*-*	*0a*	*0*	*-*	*-*	*6b*	*8,6*	*-*	*-*		
I tried to pay attention	*2a*	*2,9*	*-*	*-*	*22b*	*31,4*	*-*	*-*	*44c*	*63*	*-*	*-*		
No, I did not pay attention	*33a,b*	*47,1*	*-*	*-*	*47b*	*67,1*	*-*	*-*	*20a*	*29*	*-*	*-*		
I don't know what Bisphenol A is	*35a*	*50*	*-*	*-*	*1b*	*1,4*	*-*	*-*	*0b*	*0*	*-*	*-*		
Have you been informed that Bisphenol A may be associated with infertility?	*11a*	*15,7*	*59a*	*84,3*	*69b*	*98,6*	*1b*	*1,4*	*69b*	*99*	*1b*	*1,4*	*155,449*	*<0,001*
When buying toys, do you pay attention to whether they contain Bisphenol A or not?	*6a*	*8,6*	*64a*	*91,4*	*55b*	*78,6*	*15b*	*21,4*	*59b*	*84*	*11b*	*15,7*	*101,617*	*<0,001*

Table 2: The Comparison of Women's Level of Knowledge on Bisphenol Before, One Week After and One Month After the Training According to Time Measurements

p<0.05, χ2: Pearson Chi-Square Test, *Fisher's Exact Test, a-c: Lettering was done on a row basis. For rows with Yes-No answers, yes and no answers were evaluated within themselves. There is no difference between the variables with the same letter. In Table 2, the answers they gave to the questions before, one week and one month after the training on Bisphenol were compared. For the changes in the answers given over time, it was determined that the ideas "We should not consume water in plastic bottles left in the car" and "Plastic cups and stirrers for hot tea, coffee and other liquids should be banned" under the title of "Behaviors to be considered" did not change over time (p>0.05). It was observed that the ideas in all other titles changed (p<0.05).

The use of plastic cups and bottles decreased significantly one week and one month after the training, and the use of plastic utensils and storage containers and containers made of artificial foam decreased significantly one week after the training, but this decrease was not significant although the number of users decreased after the training. It was determined that the behaviors such as "We should not put plastic containers in the fridge", "We should immediately empty the water from the carboys into a glass container", "We should use glass feeding bottles", "We should not put

plastic containers in the microwave oven", "Plastic containers should not be washed in the dishwasher", "Plastics should not be washed with harsh detergents" and "Glass bottles and containers should be used for the consumption of food" under the title of "Behaviors to be considered" increased significantly one week after the training, and this increase continued one month after the training, but it was not significant ($p>0.05$). The number of people who paid attention to the use of plastic containers increased one week and one month after the training, but the increase after one week was significant, while the increase after one month was not significant. The number of people who thought that plastic makes life easier decreased one week and one month after the training, but the significant difference was between the period of pre-training and one month after the training.

The number of those who used plastic cutting boards decreased one week and one month after the training, but the decrease after one week was significant, while the decrease after one month was not significant. On the other hand, the number of those who were informed that Bisphenol A may be associated with infertility and those who paid attention to whether toys contain Bisphenol A increased one week and one month after the training, but the increase after one week was significant, while the increase after one month was not significant. It was found that there was a significant difference between the times according to the type of utensils used for heating water, and this difference was due to porcelain teapot and steel kettle ($p<0.05$). It was determined that there was a significant difference ($p<0.05$) between the storage conditions of fruits and vegetables in the fridge, attitudes towards the use of plastic bags, the use of plastic food containers in microwave ovens, opinions on whether canned foods should be used or not, and opinions on whether those who have dental prostheses or crowns pay attention to whether they contained Bisphenol A or not.

Discussion

Only 12.9% of the women who participated in this study had received information about Bisphenol before. The use of containers containing Bisphenol A by the women who participated in this study decreased significantly both in the first week and one month after the training. Except for some of the behaviors that women paid attention to, the others turned significantly positive one week and one month after the training. The women significantly paid attention to the type of utensils they used while heating water after the training. Following the training, the way women stored fruits and vegetables in the fridge changed significantly from plastic to glass and paper bags. Over time, there was a significant difference between the opinions on the use of plastic food containers in microwave ovens, between the opinions on whether canned foods should be used or not, and between the opinions on whether those who have dental prostheses or crowns pay attention to whether they contain Bisphenol A or not. In a study conducted to determine the risk factors of breast cancer patients, it was found that 88.5% of women used containers containing Bisphenol A [9].

In another study conducted with pregnant women, the rate of pregnant women storing food in plastic containers was 100%, and the rate of those who agreed with heating food in plastic containers was 65% [10]. Although the results of this research are similar to the studies in the literature, more research needs to be conducted on this issue. Many of the studies on Bisphenol A focus on whether Bisphenol A is a cause of a disease or the concentration of Bisphenol A in products such as food and packaging. Nevertheless, according to the results of this research, it is observed that very few women have knowledge about Bisphenol A and pay attention to their behaviors regarding Bisphenol A after receiving training on this issue. Women's level of knowledge about Bisphenol A and their attention to this issue constitute the focal points of this study. It is thought to be important for consumers to be conscious to solve a problem.

Conclusions and Suggestions

The women who participated in this study had low levels of knowledge about Bisphenol A. Women with low levels of knowledge naturally do not pay attention to substances containing Bisphenol A. On the other hand, women paid significant attention to Bisphenol A when they were informed about this issue. Therefore, it is suggested that these trainings should be increased and further studies should be conducted on this issue.

References

1. Bousoumah, R., Leso, V., Iavicoli, I., Huuskonen, P., Viegas, S., Porras, S. P., ... &Ndaw, S. (2021). Biomonitoring of occupational exposure to bisphenol A, bisphenol S and bisphenol F: A systematic review. *Science of the Total Environment, 783,* 146905.
2. Hwang, S., Lim, J. E., Choi, Y., & Jee, S. H. (2018). Bisphenol A exposure and type 2 diabetes mellitus risk: a meta-analysis. *BMC endocrine disorders, 18,* 1-10.
3. Jagne, J., White, D., & Jefferson, F. (2016). Endocrine-disrupting chemicals: Adverse effects of bisphenol A and parabens to women's health. *Water, Air, & Soil Pollution, 227,* 1-10.
4. Wang, X., Nag, R., Brunton, N. P., Siddique, M. A. B., Harrison, S. M., Monahan, F. J., & Cummins, E. (2022). Human health risk assessment of bisphenol A (BPA) through meat products. *Environmental Research, 213,* 113734.
5. Konieczna, A., Rutkowska, A., & Rachon, D. J. R. P. Z. H. (2015). Health risk of exposure to Bisphenol A (BPA). *Roczniki Państwowego Zakładu Higieny, 66*(1).
6. Ehrlich, S., Williams, P. L., Missmer, S. A., Flaws, J. A., Ye, X., Calafat, A. M., ... & Hauser, R. (2012). Urinary bisphenol A concentrations and early reproductive health outcomes among women undergoing IVF. *Human reproduction, 27*(12), 3583-3592.
7. Siracusa, J. S., Yin, L., Measel, E., Liang, S., & Yu, X. (2018). Effects of bisphenol A and its analogs on reproductive health: A mini review. *Reproductive toxicology, 79,* 96-123.

8. Tomza-Marciniak, A., Stępkowska, P., Kuba, J., & Pilarczyk, B. (2018). Effect of bisphenol A on reproductive processes: A review of in vitro, in vivo and epidemiological studies. *Journal of Applied Toxicology, 38*(1), 51-80.
9. Tuna, A., Vural, G., & Karaaslan, E. (2022). Meme Kanserli Hastalarda Risk Faktörlerinin Belirlenmesi. *Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 6*(2), 180-192.
10. Callan, A. C., Hinwood, A. L., Heffernan, A., Eaglesham, G., Mueller, J., & Odland, J. Ø. (2013). Urinary bisphenol A concentrations in pregnant women. *International journal of hygiene and environmental health, 216*(6), 641-644.