

AWARENESS ON THE SIDE EFFECTS OF USING SINGLE USE PLASTICS AMONG HIGHER SECONDARY STUDENTS IN TIRUNELVELI DISTRICT

Dr.M.MariaSaroja, Research Director, Associate Professor of Biological Science & Former Controller of Examinations,
St.Ignatius College of Education(Autonomous), Palayamkottai.
E.Michael Jeya Priya, Assistant Professor of Biological Science,
St.Ignatius College of Education(Autonomous), Palayamkottai.

Abstract

Single-use plastic items are those designed to be used once and then thrown away. Single-use plastic bags and Styrofoam products are widely used because they are strong, cheap and hygienic ways to transport goods. Chemicals present in these plastics such as BisphenolA (BPA) and phthalates can cross the placenta and result in growth retardation and neurological harm. Phthalates play a major role in causing human diseases like male reproductive dysfunction, breast growth, and testicular cancers. Continuous use of plastic materials leads to hormonal derangements and cancers in children. The main objective of the study was to find out the awareness of the side effect of single-use plastics among higher secondary students in Tirunelveli district. Survey method was adopted in this study. The sample consists of 500 higher secondary students in Tirunelveli. Side Effects of Single-Use Plastic Awareness Scale were developed by Maria Saroja, M and Michael Jeya Priya, E (2019) has been used for collecting data. Percentage analysis 't'- test and χ^2 were used for analyzing the data. The present study revealed that there was a significant difference among higher secondary students in their awareness of the side effects of using single-use plastics.

Keywords: Styrofoam, Phthalates, Placenta

Introduction

In the modern era of technology and development single-use plastic plays an important part in our lives. They are used everywhere in our lives. They are composed of a network of molecular monomers bound together to form macromolecules of infinite use in human society. (Medhi,2018). Plastics are mostly made from the by-products of the petroleum manufacturing processes, they are very inexpensive. The three most common plastic additives linked to human disease are BPA or Bisphenol A, Plasticizers or Phthalates and flame retardants. (Benachour&Aris, 2009). According to U.N environmental reports just nine percent of the world's nine billion tonnes of plastic has been recycled. If these single-use plastic items are discarded improperly, they often end up in water bodies. Phthalates have been found to deposit in the fatty tissues to the body, where they act as anti-androgens. (Proshadet al.,2018).Phthalates play a major role in human disease. BPA which is often found in the food-grade plastic known as polycarbonates, also used in hospital disposables, has been found to have an estrogenic side effect profile. (Hauser &Calafat, 2005). It is found to have detrimental effects on human placental tissues.BPA has been linked with premature birth, intrauterine growth retardation, preeclampsia, and stillbirth. (Sathyanarayana,2008)Flame retardants used in electric and electronic equipment, upholstery and other items to provide fire safety benefits. Some of these substances have been banned by the UN due to the detrimental effects they had on the environment and human health (Richards & Blair,2017). Styrofoam items contain toxic chemicals such as styrene and benzene. Both are considered carcinogenic and can lead to additional health complications, including adverse effects on the nervous, respiratory and reproductive systems, and possibly on the kidneys and liver (Smith & John, 2018). Plastic bags and Styrofoam containers can take up to thousands of years to decompose, contaminating soil and water, and posing significant ingestion, choking

and entanglement hazards to wildlife on land and in the ocean (Mishra, 2012). Due to their lightweight and balloon-shaped design, plastic bags are easily blown in the air, eventually ending up on land and in the ocean. The aim of the present study is to know about the awareness of the side effects of using single-use plastics among higher secondary students.

Significance of the Study

Single-use Plastics are responsible for many major problems that our environment is facing today. Materials like plastic bags, straws, coffee stirrers, soda, and water bottles and most food packaging are made by single-use plastics. Plastic bags are made from crude oil, natural gas, and other petrochemical derivatives. Plastic bags can take around 1,000 years to degrade – they are not biodegradable and can only degrade because of the UV rays of the sun. Although plastic will not biodegrade it will degrade into tiny particles after many years. In the process of breaking down, it releases toxic chemicals that make their way into our food and water supply. These toxic chemicals are being found in our bloodstream and disrupt the endocrine system which can cause cancer, infertility, birth defects, impaired immunity, and many other ailments. Burning of plastics cause emissions of toxic gases and release a toxic carcinogen called dioxin. The dioxin affects the function of the reproductive and immune systems. The exposure and inhalation of toxic fumes cause skin and respiratory problems. Direct toxicity from plastics comes from lead, cadmium, and mercury. These toxins have also been found in many fish in the ocean, which is dangerous for humans. Diethylhexyl phthalate (DEHP) contained in some plastics, is a toxic carcinogen. Plastics are directly linked to cancers, birth defects, immune system problems, and childhood developmental issues. BPA present in plastics resulted in mammary cancer and chronic inflammation of the prostate. Plastic leaching toxins enter into food and drink and entering our food chain through micro plastics and nano plastics. It is necessary for adolescents to know about the harmful effects of single-use plastics so that they can reduce the usage of single-use plastics. Lack of research in this field motivated the researchers to undertake this research. The aim of the study is to enlighten the students about the dangerousness of single-use plastics in human health.

Objectives of the Study

- To find out the level of awareness on the side effects of using single-use plastics among higher secondary students.
- To find whether there is any significant difference between higher secondary students in their awareness on the side effects of using single-use plastics with reference to the following background variables
 - (i) Gender (ii) Locality of School (iii) Medium of Instruction (iv) Internet Usage
- To find whether there is any significant association among higher secondary students in their awareness on the side effects of using single-use plastics with reference to the following background variables
 - (i) Father's Educational Qualification (ii) Mother's Educational Qualification

Hypotheses of the Study

- Awareness on the side effects of using single-use plastics among higher secondary students is moderate.
- There is no significant difference between higher secondary students in their awareness on the side effects of using single-use plastics with reference to the following background variables.
 - (i) Gender (ii) Locality of School (iii) Medium of Instruction (iv) Internet Usage
 - There is no significant association among higher secondary students in their awareness on the side effects of using single-use plastics with reference to the following background variables.
 - (i) Father's Educational Qualification (ii) Mother's Educational Qualification

Population

The population includes higher secondary students of Tirunelveli.

Sample

The investigators used a simple random sampling technique and randomly selected 500 higher secondary students in Tirunelveli District.

Statistical Techniques Used in the Present Study

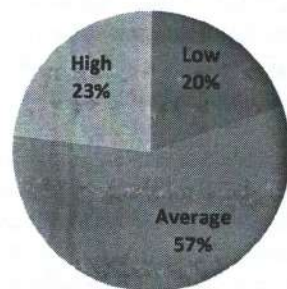
Side Effects of Using Single-Use Plastic Awareness Scale was developed by Maria Saroja, M and Michael Jeya Priya, E (2019). Percentage analysis, 't' and χ^2 test were the statistical techniques used for carrying out the analysis of data.

Data Analysis and Interpretation**Table.1.**

Showing the Level of Awareness on the Side Effects of Using Single-Use Plastics among Higher Secondary Students in Tirunelveli District

Total	Low		Average		High	
	N	%	N	%	N	%
	98	20	285	57	117	23

Figure.1. Showing the Percentage Level of Awareness on the Side Effects of Using Single Use Plastics Among Higher Secondary Students in Tirunelveli District

**Interpretation of table-1**

It is revealed from the above table that among the Higher Secondary Students 19.60% have low, 57.00% have average and 23.40% have high level of awareness about the side effects of using single-use plastics.

Table-2

Difference between Male and Female Higher Secondary Students in their Awareness on the Side Effects of Using Single-Use Plastics.

Variable	Categories	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Gender	Male	293	26.26	4.21	3.56	1.96	S
	Female	207	27.63	4.31			

Interpretation of table-2

There is significant difference between male and female higher secondary students in their awareness about the side effects of using single-use plastics. In the present study, the mean of single-use plastics awareness scale value of female students (27.63) is greater than that of male students (26.26). This may be due to the fact that female students are aware of health hazards caused due to single-use plastic materials. They have more concrete knowledge about the side effects of plastics, and they apply their knowledge at a practical level more often than the male students. Female students usually have more extensive environmental knowledge than males and show more concern about environmental destruction. They show very much interest in participating health awareness programme. Female students take part in rally to highlight the importance of health and hygienic practices. Their involvement in various co-curricular activities in schools helps them to develop awareness about single-use plastics hazards. They show a high level of interest in reading pamphlets on hazards of plastic bags which had placed near check-outs or cash counters in grocery stores and shops. This survey found that transferring knowledge to behavior would take some time for male students. Similar findings were noticed in the studies conducted by Hammami et al. (2017). In their study female students have high knowledge scores regarding plastic pollution and its effects.

Figure.2. Showing the mean difference in awareness on the side effects of single-use plastics among higher secondary students in Tirunelveli District

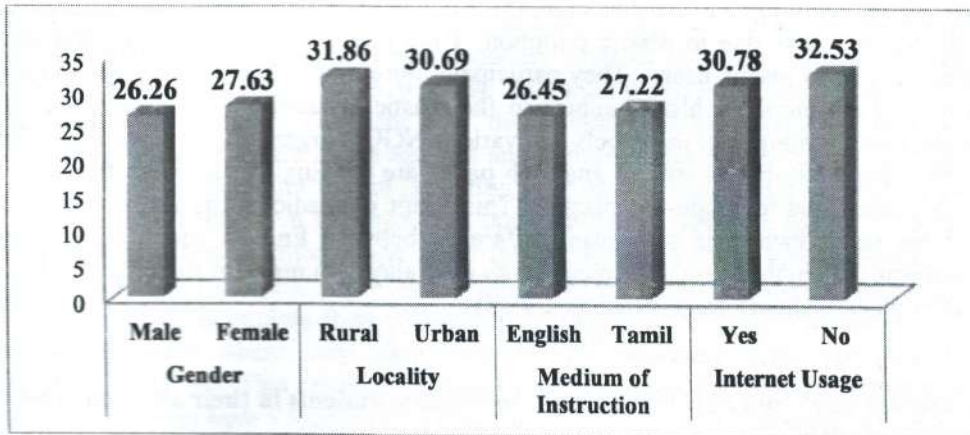


Table-2

Difference between rural and urban higher secondary students in their awareness on the side effects of using single-use plastics

Variable	Categories	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Locality	Rural	258	31.86	4.56	2.85	1.96	S
	Urban	242	30.69	4.63			

Interpretation of table-2

There is significant difference between the rural and urban higher secondary students in their awareness about the side effects of using single-use plastics.

In the present study, the mean of single-use plastic awareness scale value of rural students (31.86) is greater than that of the urban students (30.69). This may due to the fact that rural students read more environment-related books in local language compared to urban students. Rural areas people are more dependent on natural resources and organic materials. Rural students are more community-based people and depend on social gatherings and other similar events. Since they take various steps in conserve and preserve natural resources for their next generation. Their joint family system helps them to understand the hazards caused due to the usage of plastic plates, tumblers, straw, polythene bags, etc. They believe that plastic wastes, thrown on the sides of the road, open areas, riverbanks, drainage canals, and common places resulted in death and health problems of cattle. Rural students are motivated both by their grandparents and parents to use alternate eco-friendly bags like paper or cloth bags. This result contradicted the research conducted by Gopinath.G (2014) in his research he showed that the mean score of urban students (33.47) is greater than the mean score of rural students (29.77). In his study, he inferred that the urban students have higher awareness regarding the environment.

Table-3

Difference between English medium and Tamil medium higher secondary students in their awareness on the side effects of using single-use plastics

Variable	Categories	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Medium of instruction	Tamil	258	26.45	4.43	2.02	1.96	S
	English	242	27.22	4.17			

Interpretation of table-3

There is significant difference between the English and Tamil medium higher secondary students in their awareness about the side effects of using single-use plastics.

In the present study, the mean of single-use plastic awareness scale value of English medium students (27.22) is greater than that of Tamil medium students (26.45). English medium students read more articles and papers related to health issues cause due to plastic pollution. They verify different websites and share their views about health hazards due to plastic usage. They participate more in awareness campaigns organized by their school management. They enroll in high numbers in the plastic awareness competition such as poem writing, drawing, debate, essay writing, etc. in schools and various NGO's organizing competitions compare to Tamil medium students. Many web-based articles and web pages are in English language they feel easy to learn about the hazards caused due to single-use plastics. This result contradicted the research conducted by Gopinath.G (2014) in his result there is a significant difference between English and Malayalam medium students' awareness towards the environment. The mean score of Malayalam medium students (34.0) is greater than the mean score of English medium school students (29.77).

Table-4

Difference between internet users and non-users higher secondary students in their awareness on the side effects of using single-use plastics

Variable	Categories	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Internet usage	Yes	297	30.78	4.46	1.75	1.96	NS
	No	203	31.53	4.86			

Interpretation of table-4

There is no significant difference between the internet users and non-users of higher secondary students in their awareness about the side effects of using single-use plastics.

Table-5

Association among awareness on side effects of using single-use plastics of higher secondary students and their father's education qualification

Father's Education	Low	Average	High	df	Calculated X ² Value	Table Value	Remark
Literate	12(9)	24(27)	11(11)	4	2.74	9.49	NS
School	21(20)	54(58)	26(23)				
Degree	65(69)	211(203)	76(80)				

(At 5% level of significance for 6df, the table value of X² is 12.59)

Interpretation of table-5

It is inferred from the above table that there is no significant association among the awareness on side effects of using single-use plastics of higher secondary students and their father's education qualification

Table-6

Association among awareness on side effects of using single-use plastics of higher secondary students and their mother's education qualification

Mother's Education	Low	Average	High	df	Calculated X ² Value	Table Value	Remark
Literate	4(8)	16(23)	27(16)	4	20.17	9.49	S
School	13(18)	45(49)	43(35)				
Degree	70(61)	181(170)	101(120)				

(At 5% level of significance for 6df, the table value of X^2 is 12.59)

Interpretation of table-5

It is inferred from the above table that there is a significant association among the awareness on the side effects of using Single-use plastics of higher secondary students and their mother's education qualification. This may be due to the fact that mothers who are educated being more knowledgeable and inclined towards pro-environmental behavior. They are very much interested in inculcating environmental awareness to their children as they are aware of the dangers and consequences of environmental degradation at the global level. Mothers play an important role in educating their children about the hazards of plastics. Their wide exposure towards media helps them to understand the hazards of single-use plastics. Radio and television also help in mass dissemination of information about the hazards of plastics among educated mothers. They guide their children to carry cloth/jute/ paper bags while shopping. Their continuous updating habits and exposure towards the internet lead to explain their children about the causative agents of various pollutions. They visit various shops and malls where they learn many things regarding plastic pollution through posters, pamphlets, advertisements, etc. This result supported by the study conducted by Hammami et al. (2017). In their study educated mothers have a high level of environmental awareness compared to uneducated mothers.

Conclusion

Toxicity of plastic is a problem in nature on a universal scale, from the individual level to the level of populations. Single-use plastics cause serious environment pollution such as soil pollution, water pollution, and air pollution. The application of proper rules and regulations for the production and use of plastics can reduce the toxic effects of plastics on human health and the environment. The government law implementing agencies and health authorities of the country should take more steps to pay attention to sustainable production, use, and disposal of plastics. School management should take initiative to increase the awareness inside the campus regarding the effects of single-use plastic on human health and the environment. The corporation should install a refillable water bottle station in people gathering areas. Government funding agencies and N Go's should come forward to create and broadcast public service announcements (PSA) regarding single-use plastics and the effects on the environment. ECO Club in schools helps to reduce the number single-use water bottles in the school campus. The various means to enable the easy availability of information should support awareness generation initiatives. For example, the display of banners with the intention of creating awareness on the use of alternative bags and eco-friendly materials could be an effective low-cost information strategy. Parents must take responsibility in terms of the reduction of unnecessary plastic consumption. Companies must provide full information about all existing chemicals in consumer products. Various co-curricular activities in schools may be encouraged to help in developing an awareness of plastics. There is an urgent need to organize and conduct an awareness campaign; Group discussions in school should focus on environmental issues. The main purpose of this study to spread awareness towards the side effects of using single-use plastics among higher secondary students. This survey will create awareness and provide a pathway for health education to broaden for a change towards the plastic-free environment and help to leads a better life.

References

1. Benachour, N., & Aris, A. (2009). Toxic effects of low doses of bisphenol-A on human placental cells. *Toxicology and Applied Pharmacology*, 241, 322-328. Retrieved from <https://doi.org/10.1016/j.taap.2009.09.005> on 5.4.19.
2. Gopinath, G. (2014). A study on the environmental awareness among secondary school students in a district of Kerala state. *International Journal of Education and Psychological Research*, 3(4), 54-57. Retrieved from http://ijepr.org/doc/V3_Is2_June14/ij11.pdf on 06.06.2019
3. Hammami, M. B. A., Mohammed, E. Q., Hashem, A. M., Khafaji, M. A., Alqahtani, F., and Dash, N. (2016). Survey on awareness and attitudes of secondary school students regarding plastic pollution: implications for environmental education and public health in Sharjah city, UAE. *Environ Sci Pollut Res*, 24(8), 1-11. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/28712081>
4. Hauser, R., & Calafat, A. M. (2005). Phthalates and human health. *Occupational and environmental medicine*, 62(11):806-18. Retrieved from <http://dx.doi.org/10.1136/oem.2004.017590> on 05.05.2019
5. Khan, S. H. (2013). A study of attitude towards environmental awareness in relation to certain variables among senior secondary school students. *Scholarly Research Journal for Interdisciplinary Studies*, 3(1), 4:1258-1264.
6. Medhi, R. (2018). Environmental awareness among high school students of Kamrup district. *International journal of basic and applied research*, 8(12), 648-653.
7. Mishra, S. K. (2012). Environmental awareness among senior secondary students of Maheshwar and Mandleshwar District Khargone (M.P.). *International Journal of Scientific and Research Publications*, 2(11), 1-3.
8. Proshad, R., et al. (2018). Toxic effects of plastic on human health and environment : a consequences of health risk assessment in Bangladesh. *International Journal of Health*, 6(1), 1-5. Retrieved from <https://www.sciencepubco.com/index.php/IJH/article/view/8655>.
9. Richards & Blair. (2017). Concerns about single use bags prompt review into use of thicker bags at retailers. *The Mercury*. Retrieved from <http://www.themercury.com.au/news/tasmania/concernsabout-single-use-bags-prompt-review-into-use-of-thicker-bags-at-retailers/news-story/8439ed65472ac35e66de62d57b5ac178>
10. Sathyanarayana, S. (2008). Phthalates and children's health. *Curr. Probl. Pediatr. Adolesc. Health Care*, 38, 34-49. Retrieved from <https://doi.org/10.1016/j.cppeds.2007.11.001>.
11. Smith & John. (2018). Greek shoppers responding to plastic bag ban. Retrieved from <http://greece.greekreporter.com/2018/02/06/greekshoppers-responding-to-plastic-bag-tax/>
12. Thompson, R. C., et al. (2009). Plastics, the environment and human health: current consensus and future trends. *Philos Trans R Soc Lond B Biol Science*, 364(1526):2153-66.