

Effectiveness of Educational Intervention Regarding Plastic Uses and its Hazards Among Medical Students

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Abstract: **Introduction:** Plastic pollution refers to the build-up of plastic products that have a harmful impact on the environment. Excessive plastic usage has emerged as a significant environmental concern. Plastics are flexible, cost-effective, and simple to manufacture in comparison to materials such as glass and metal, which can contain dangerous chemicals. The danger of plastic is reducing our life span. Plastic clogs sewage systems in cities, negatively impacts waterways, and greatly disrupts biodiversity. **Methods:** An experimental study was conducted on effectiveness of educational intervention regarding plastic hazards among medical students at Jalalabad State University, Jalalabad, Kyrgyzstan with the objective to identify the effectiveness of educational intervention regarding plastic hazards which included 200 medical students. Purposive sampling technique was used for the study. Data was collected through semi structured self-administered questionnaire method. Calculated p value was found to be less than 0.05 (<0.05) which means there was significant increase on knowledge and attitude on plastic uses and its hazards. **Result:** In pre- test 191 (95.20%) of the respondent had moderate knowledge and 200 (100%) had gained adequate knowledge in post- test. The present study concluded showing that significant increment in post- test than in pre- test among the medical students on plastic hazards. **Conclusion:** Hence the study interpreted that the investigator needs to conduct experimental study to assess the knowledge and prevent the hazards of plastic uses.

Keywords: intervention, knowledge, plastic hazards, students.

1. Introduction

Environment is a gift of nature, to have a healthy lifestyle one needs environment free of pollution. Otherwise, we become prone to fatal health disorders. Our environment is effected by various pollution like air, water land pollution among which plastic pollution is also one of the current problem faced.

Accumulation of plastics in any area which causes negative impact on surroundings and human health is broadly termed as plastic pollution [1]. Plastic Pollution is a growing global issue of an individuals, organizations, businesses, and policy makers working toward a world free of plastic pollution and its toxic impacts on humans, animals, waterways and oceans, and the

environment.

Plastic pollution can affect land, waterways and oceans. Living organisms, particularly marine animals, can be harmed either by mechanical effects, such as entanglement in plastic objects or problems related to ingestion of plastic waste, or through exposure to chemicals within plastics that interfere with their physiology. Humans are also affected by plastic pollution, such as through disruption of various hormonal mechanisms [2]. If providing education regarding plastic hazard can change the habit of an individual and make them aware then it would create a link to spread the information about it for the better development of nation. [3]

In the last 60 years, plastic has become a useful and versatile material with a wide range of applications. Its uses are likely to increase with ongoing developments in the plastic industry. Plastic is a highly useful material and its applications are expected to increase as more new 1 products and plastics are developed to meet demands [4].

Younger generation and young children are more vulnerable to the illness because of exposure since childhood. The long-lasting effects could be brought down through an awareness and modification of the life style at the early age of their life. This could be possible through the education given to them in the school days. If providing education regarding plastic hazard can change the habit of an individual and make them aware then it would create a link to spread the information about it for the better development of nation [5].

According to 2012 report by Global Industry Analysis plastic consumption is to reach 297.5 million tons by the end of 2015[6]. Plastic pollution is a growing issue in the ocean. In 1990, the minor sources of plastic hazards were plastic bottle of liquid hand cleanser. In today's context, plastic is everywhere [7]. It takes 500 years to bio – degrade which not only harms us but also our new generations. But still there are many factors that hinders the change process. Although other areas like Parbat, Myagdi, damak and Illam has followed suit and made plastic free zone but practice is seen in very less amount [8].

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2. Methods and Methodology

An experimental study was conducted on effectiveness of educational intervention regarding plastic uses and its hazards among 1st year medical students at Jalalabad State University, Jalalabad, Kyrgystan with the objective to identify the effectiveness of educational intervention regarding plastic hazards. Total sample size contained 226 first year medical students of Jalal Abad State University out of which 26 students withdraw from the research study. So, the final sample size was 200.

Pre experimental one group pre- test, Post-test design was adopted with purposive sampling technique. Data was collected through semi structured self-administered questionnaire method. Paired t – test was applied in 0.05 significance level for testing the hypothesis to find out the difference on knowledge and attitude on plastic hazards among medical students before and after intervention. Calculated p value was found to be less than 0.05 (<0.05) which means there was significant increase on knowledge and attitude on plastic uses and its hazards.

3. Results

Out of 200 study population, the socio-demographic characteristics of the studied population in age distribution of respondents maximum 57.5% were in age below 20 years and remaining 42.5% were in age group above 20 years. 68% of the studied participants were females and remaining 32% of them were male population who took part in the study. Regarding parents educational level 62% of the respondents parents have completed their university level education and 13.5% have only completed their high institute level education whereas very less only 5% have completed doctor degree.

The table 1 shows that level of respondents knowledge about the uses of plastic and its hazards before giving them intervention. It shows that only 27% of the respondents said that all plastic products are not usable. Similarly, 39.5% of respondents gave correct answer regarding plastic products are biodegradable and shaped into different shapes. Whereas only 20% said correct answer regarding plastic materials rust and biodegrade and remain in the environment for long periods. Similarly, 32% of the respondents were able to say the problems associated with plastic pollution and correct answer regarding ecofriendly alternative of plastic bags.

The table 2 shows that level of respondents knowledge about the uses of plastic and its hazards after giving them intervention. It shows that the respondents said that all plastic products are not usable, the respondents percentage for giving correct answer was increased to 55.5%. Similarly, 86% of respondents gave correct answer regarding plastic products are biodegradable and shaped into different shapes. In the same way the respondents percentage to give correct answer was increased to 85% after giving intervention for questioning whether plastic materials rust and biodegrade and remain in the environment for long periods or not. Similarly, 94.5% of the respondents were able to say the correct answer regarding problems associated with plastic pollution and 92.5% correct answer regarding ecofriendly alternative of plastic bags.

The table 3 shows the pre- test and post- test knowledge on plastic hazards. 9 (4.5%) of the respondents had low level of knowledge on plastic hazards and 191 (95.20%) of the respondents have moderate level of knowledge on pre-test. Whereas, after educational intervention, majority 200 (100%) of the respondents had high level knowledge in posttest.

Table 1
Knowledge of the respondents about plastic usage and its hazards before giving intervention

Items of knowledge	Before Intervention	
	Frequency	Percentage (%)
All plastic products are not usable	54	27.0
Plastic is made from petroleum derivatives as well as some chemicals	73	36.5
The use of plastic leads to the death of all living things	18	9.0
Plastic waste is one of the reasons of environmental pollution	110	55.0
Plastic products are biodegradable and shaped into different shapes	79	39.5
Plastic products are a cause of miscarriage and birth defects	68	34.0
Plastic materials rust and biodegrade and remain in the environment for long periods	40	20.0
Types of plastic products	87	43.5
Cause of plastic pollution	49	24.5
Problems associated with plastic pollution	64	32.0
Ecofriendly alternative of plastic bags	64	32.0
Adverse health effects of plastic on human health	47	23.5

Table 2
Knowledge of the respondents about plastic usage and its hazards after giving intervention

Items of knowledge	After Intervention	
	Frequency	Percentage
All plastic products are not usable	111	55.5
Plastic is made from petroleum derivatives as well as some chemicals	151	75.5
The use of plastic leads to the death of all living things	131	65.5
Plastic waste is one of the reason of environmental pollution	188	94.0
Plastic products are biodegradable and shaped into different shapes	172	86.0
Plastic products are a cause of miscarriage and birth defects	186	93.0
Plastic materials rust and biodegrade and remain in the environment for long periods	170	85.0
Types of plastic products	140	70.0
Cause of plastic pollution	191	95.5
Problems associated with plastic pollution	189	94.5
Ecofriendly alternative of plastic bags	185	92.5
Adverse health effects of plastic on human health	172	86.0

Table 3
Distribution of respondents according to the level of knowledge in comparison with pre test and post test

Level of Knowledge	Pre-test		Post Test	
	Frequency	Percentage	Frequency	Percentage
Low level of Knowledge	9	4.5	0	0
Moderate level of Knowledge	191	95.5	0	0
High level of Knowledge	0	0	200	100

Table 4
Comparison between knowledge of the study participants about plastic usage and its hazards before and after giving intervention

Items of knowledge	Before		After		p-value*
	N	%	N	%	
All plastic products are not usable	54	27.0	111	55.5	0.001
Plastic is made from petroleum derivatives as well as some chemicals	73	36.5	151	75.5	0.001
The use of plastic leads to the death of all living things	18	9.0	131	65.5	0.001
Plastic waste is one of the reasons of environmental pollution	110	55.0	188	94.0	0.001
Plastic products are biodegradable and shaped into different shapes	79	39.5	172	86.0	0.001
Plastic products are a cause of miscarriage and birth defects	68	34.0	186	93.0	0.001
Plastic materials rust and biodegrade and remain in the environment for long periods	40	20.0	170	85.0	0.001
Types of plastic products	87	43.5	140	70.0	0.001
Cause of plastic pollution	49	24.5	191	95.5	0.001
Problems associated with plastic pollution	64	32.0	189	94.5	0.001
Ecofriendly alternative of plastic bags	64	32.0	185	92.5	0.001
Adverse health effects of plastic on human health and aquatic animals	47	23.5	172	86.0	0.001

Significant at $p=0.001$ *

Table 5
Comparison of attitude of the study participants about plastic usage and its hazards throughout the study phases before and after the intervention

Items of attitude	Before		After		P Value*
	n	%	n	%	
Lack of awareness of the danger of using plastic is the reason why people rely on it	96	48.0	173	86.5	0.001
Plastic is harmful to health, the environment and fish	67	33.5	195	97.5	0.001
Are you willing to reduce your use of plastic products	40	20.0	160	80.0	0.001
I prefer to bring hot food in plastic containers	64	32.0	196	98.0	0.001
I teach my children (brothers) to use glass cups	42	21.0	172	86.0	0.001
I think the low price of plastic products is one of the reasons for its spread	69	34.5	195	97.5	0.001
There is alternative used other than plastic products	0	0.0	184	92.0	0.001
I think that plastic is harmful to health because it does not decompose easily	37	18.5	174	87.0	0.001
I think that plastic is harmful to health because it is made of petroleum derivatives	45	22.5	200	100	0.001

*All P values are significant at $p=0.001$

Regarding plastic products reusable before intervention program 27 % of the respondents said they are not usable whereas after interventional session almost 55 % said they are not always usable. Similarly, only 9% respondents said plastic will lead to death of all the living things, whereas after training program 65.5% said that plastic are dangerous to all living things. The pre-intervention survey indicated that only 24% of respondents were aware that plastic causes pollution. This suggests a low level of awareness among the population regarding the environmental impact of plastic. However, after the intervention session, a staggering 95% of respondents acknowledged that plastic causes pollution.

This significant increase suggests that the intervention session effectively educated the participants about the harmful effects of plastic on the environment. It likely provided information about the detrimental consequences of plastic pollution, such as its impact on marine life, ecosystems, and human health. The intervention could have included various educational methods, such as presentations, discussions, visual aids, or hands-on activities, to effectively convey the message.

Overall, the shift from 24% to 95% demonstrates the power of education and awareness campaigns in influencing people's understanding and attitudes towards environmental issues like plastic pollution. The initial survey showed that 32% of respondents believed that eco-friendly alternatives to plastic

should be used. This indicates some existing awareness and concern among the population regarding the need for more sustainable alternatives to plastic.

However, after the intervention session, the percentage of respondents who agreed that eco-friendly alternatives should be used skyrocketed to 92.5%. This significant increase suggests that the intervention effectively communicated the importance of transitioning away from plastic towards more environmentally friendly options.

The intervention likely provided information about the detrimental impacts of plastic on the environment, as well as showcased various eco-friendly alternatives available, such as biodegradable materials, reusable products, and sustainable packaging options. Additionally, it might have highlighted the benefits of adopting these alternatives, including reduced pollution, conservation of natural resources, and protection of wildlife.

The dramatic shift from 32% to 92% indicates a strong influence of the intervention in shaping people's attitudes and willingness to embrace eco-friendly alternatives to plastic. It reflects a growing recognition and acceptance of the need for more sustainable practices to mitigate the environmental challenges posed by plastic pollution.

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4. Discussion

Yearly million tons of plastic waste polluted seas, oceans, and rivers and it damaged whales, fish and other sea creatures. Plastic waste has a negative effect on humans, animals, birds, and etc., included impaired immune function, kidney and liver failure, improper lung function, obese and diabetes, eye, nose, and throat discomfort (9). Therefore, there is a great need to increase awareness among our community for adequate disposal and recycling of plastic waste which achieves the aim of the research. So, the aim of this study was to determine the effect of a health education program on knowledge, and attitude regarding plastic usage and its hazards among medical students. The current study revealed that the studied participants' age shows that maximum 57.5% were in age below 20 years and remaining 42.5% were in age group above 20 years and more than two thirds of the studied participants were females and lived with the nuclear families.

Our study also shows the family monthly income of respondents 61.5% said they have enough income whereas remaining 38.5% said they didn't have enough monthly family income. Similarly, regarding parents' educational level 62% of the respondents parents have completed their university level education and 13.5% have only completed their high institute level education whereas very less 5% have completed doctor degree.

This study was presented that there was a significant statistical improvement in all items of practices regarding plastic products usage of studied participants before and after an educational intervention. This result was similar to the study of Srinivasan, et al., (2019) who assessed the knowledge and attitude on plastics use and its hazards among students and reported that more than one third of the participants had a moderate level of knowledge and slightly less than one third of

them had a good attitude [10]. Concerning the correlation between age, gender, parents educational status, family types etc., change in knowledge, and attitude after the intervention; the current study found that, there was no any significant correlation between the knowledge and attitude change was observed.

A significant association between before-and-after intervention measurements in a study aimed at reducing plastic reliance by increasing awareness about its dangers can be illustrated through a hypothetical pre-experimental study. The study employs a one-group pretest-posttest design to evaluate the impact of a public awareness campaign on people's knowledge about the dangers of plastic and their subsequent use of plastic products.

Before the intervention, baseline measurements were taken to assess participants' awareness of the environmental and health impacts of plastic use and their current reliance on plastic.

These findings were consistent with those of Pushpakala K. et al., (2017), who found a substantial positive connection between knowledge and participants awareness on health impact of plastic use [11]. From the researcher point of view this result highlights the importance of the educational level in changing the recipient's attitude easily.

In this study, 32% of respondents answered replace plastic bags as preventive measures in pre- test and 92.5% of respondents mentioned the same options during post- test. Regarding alternative use of plastic bags, more than half 61.90% answered paper bags in pre- test whereas majority of the respondents answered on cloth bags, baskets, jute bags and 97.60% respondents answered on paper bags in post- test.

This finding was consistent with similar studies conducted at Mangalore city among 250 respondents. Majority 86.4% of the respondent were aware of the health hazards associated with the use of plastic bags. There were 20% participants reusing plastic bags for shopping after initial usage. The cloth bags were used for shopping in place of plastic bags by 5.2% participants [12].

In this study, majority 55% of respondent answered environmental pollution as the effect of plastic pollution in pre-test and majority 65% of the respondents answered, the use of plastic leads to the death of all living beings due to harmful uses of plastic products in post- test. Regarding effects of plastic hazards in water sources, 23.5% responded mentioned that it will harm to aquatic animals during pre- test and 86% responded to harm to aquatic animals answer in post- test. This is how over the past five or six decades, contamination and pollution of the world's enclosed seas, coastal waters and the wider open oceans by plastics and other synthetic, non-biodegradable materials [13].

5. Conclusion

According to the findings of the present study, an educational intervention was successful in enhancing information and attitude of the students toward the risks associated with plastic use.

6. Recommendations

Medicine in different fields should provide educational intervention in different level to improve the information of medical students about the risks of plastic materials. Imposing tax on plastic products by the government, especially with fewer microns and non-recyclable plastic products and also administrating various campaigns and awareness activities to raise awareness about hazards caused by the use of plastic materials.

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