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Assessment of Knowledge, Attitude and Practice Regarding Single Use Plastics among the Residents of a Rural Area in a Coastal District of Karnataka - A Descriptive Study

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ABSTRACT

Background: The consumption of single-use-plastics is on the rise globally. This study was conducted to assess the knowledge, attitude and practice on single-use-plastics among the residents of a rural area in a coastal district of Karnataka.

Methods: A cross-sectional study was conducted from April to June 2019 among the residents of Madani Nagar. Data was collected by interviewing any adult member of the house aged more than 18 years using a standardised application called Epicollect 5.

Results: A total of 319 residents participated in the study. More than 70% were aware that single-use-plastics cause's harmful effects on health but more than 95% were unaware that plastic causes global warming and climatic change in the environment. The attitude towards the single-use-plastic was satisfactory since 80% of them were of opinion that single-use-plastic should be banned and more than 60% were willing to replace the plastic bag with an alternative. Practice was found to be poor since 82.4% were using plastic bag on regularly basis.

Conclusions: The overall knowledge regarding single-use-plastic was inadequate, attitude was favourable and practices were unsatisfactory. Awareness regarding single-use-plastics and its harm and strict enforcement of plastic ban is the need of the hour.

Keywords: Single use plastic, knowledge, attitude, practice, plastic, plastic bag

INTRODUCTION

It is estimated that 300 million tons of plastic is produced yearly worldwide and half of this is single use plastic.[1] Plastics are synthetic substances made from organic polymers such as polythene, PVC and nylon that can be moulded into any shape while soft and then made it into firm or slightly elastic structure.[2] Plastics are an ideal material for single-use disposable devices as they are easy to use, economical, lightweight and biocompatible.[3-4] They have many unique properties enabling them to be used at a wide range of temperatures, and it's these properties and their low cost that has driven the annual worldwide demand for plastics to reach 348 million tonnes.[5]

India consumes an estimated 16.5 million tonnes, about 1.6 million truck-full, of plastic annually, as per the June 2018 report.[5] The Central Pollution Control Board, states that "the total number of plastic waste generated in Karnataka during 2015-16 is around 1, 29,600 tons/annum.[7] The regular solid waste including all kind of plastics generated by Mangaluru is 226 tons per day with the per capita waste generation equalling to 0.45 Kg per day.[8]

It's noted that where urbanization rate is high, waste generation rate is also high and there is a direct link of urbanization with waste generation.[8]

Single-use plastics are referred to as not reusable plastics which are commonly used for plastic packaging and include substance meant to be used only once before thrown away or recycled.[4] Single use plastics include grocery bags, food packaging boxes and bags, bottles, juice straws, plastic containers, plastic cups and cutlery. Plastic bags are among the most commonly used single use plastic items with an estimated usage of 500 billion plastic bags each year worldwide.[9] Most plastics are non-biodegradable and they slowly break down into smaller fragments known as micro plastics.[10] The plastics can last up to 1000 years in the environment without being disintegrated and decomposed by sunlight and/or microorganisms.[7]

Accumulation of single use plastic waste causes environmental pollution that can be exhibited in several ways. Common problems associated with it are the deterioration of natural beauty of the environment and danger to the existence of domestic and wild animals. This demands for proactive measures in order to safeguard the destruction of animal species. If plastic waste gets their way into agricultural fields, then they will decrease percolation of water and proper aeration of soil, thereby reducing the efficiency of such fields.[7]

Single use plastic items such as plastic bags can block waterways and aggravate natural disasters. By clogging sewers and providing breeding sites for mosquitoes and pests, plastics can increase the transmission of vector borne diseases.[7] Styrofoam products used in single use plastic, contain carcinogenic chemicals like styrene and benzene, which are extremely toxic if ingested and cause damage to the nervous system, lungs and reproductive organs. Disposing of plastic waste by burning it in open-air pits releases harmful gases like furan and dioxin, which are harmful to the environment and living organisms including man.[6]

It is time to reorganize the current management model of the production and disposal of plastics and to move towards a model that works for the betterment of the society with sustainable plastic use. For this adequate knowledge, right attitude and good practice on single use plastic is most needed. So this study will thereby enable us to have the baseline information regarding the awareness of single use plastics among the study group. This information will facilitate planning of information, education and communication (IEC) strategies focussing on various single use plastics, it hazardous towards living organisms and the environment and the solution to overcome it in the community.

This study was thus conducted with the objective to assess the knowledge, attitude and practice on single use plastics among the resident of Madani Nagar, a rural costal area in Karnataka.

METHODS

A cross sectional study was conducted in Madani Nagar area that belongs to Deralakatte panchayat of Mangalore city, Karnataka. Study was conducted from April 2019 to July 2019. Adults aged more than 18 years who are residents of Madani Nagar formed the sampling frame. The prevalence of knowledge on the harmful effects of plastic in general population was considered for calculating the sample size. Previous data shows that the prevalence of knowledge on the harmful effects of plastic in general population was 75% and was assumed for calculation of sample size.[11] The sample size is estimated based on 5% significant level and 20% allowable error. This was estimated using the formula n = 4pq/l2 = 300. Data was collected by convenience sampling technique. Persons who refused to participate in the study and who were unable to comprehend and respond were excluded from the study. Ethical clearance was taken from Institutional Ethical Committee (YEC1/2019/125).

A pretested, semi-structured questionnaire was designed with information on socio-demographic profile of the participants and knowledge, attitude and practice regarding single use plastics. The data was collected using a mobile application called Epicollect 5 (manufactured by Imperial College, London).[12] The data was collected by visiting houses in Madani nagar. The data was collected by a group of approximately 15 students of 4th term MBBS, who were posted in Community Medicine Department of the Institute. The participants were explained about the nature and purpose of the study and written informed consent was obtained prior to the data collection. An estimated 80 participants were interviewed by the students on each day between 9:30 am to 11:30 am. Thus at the end of 4 days, data was collected from 319 participants.

RESULTS

A total of 319 residents of Madani nagar participated in the study. The mean age (±SD) of the study participants was 37 (±14.1) years and 75% of them were females. Regarding educational status it was found that 22% of the respondents had completed primary schooling and 17% had completed middle school with a similar proportion of people who had completed high school and pre-university education followed by 12% who were illiterate. 62.1% of the participants were housewives.

Table 1: Knowledge of study participants regarding single use plastic (N=319)

Domains	Frequency (n) (%)
Predominant single use plastic	
Plastic juice straw	277 (86.8)
Plastic coffee cup	226 (70.8)
Mineral water bottle	186 (58.3)
Food plastic container	149 (46.7)
Plastic bag/ cover	171 (53.6)
Plastic cutlery	192 (60.2)
Plastic plates and cups	189 (59.2)
Important source for plastic bag generation	
Supermarket	257 (80.6)
Fish market	263 (82.4)
Vegetable market	254 (79.6)
Departmental store	165 (51.7)
Garbage disposal	155 (48.6)
Meat stall	198 (62.1)
Single use plastic will affect the following species	
Animals	271 (85)
Birds	209 (65.5)
Marine fish	199 (62.4)
None are effected	40 (12.5)
The time taken for the plastic to degrade	
Doesn't degrade/ very long time	195 (61.1)
<50 years/ few years	60 (18.8)
<1year/ few months	64 (20.1)
Whether single use plastic is banned in their area	
Yes	65 (20.4)
No	224 (70.2)
Don't know	30 (9.4)

*Multiple responses

Table 2: Attitude of study participants regarding single use plastic (N=319)

Domains	Frequency (n) (%)
Concerns related to plastic use	
Littering and dirty looks	221 (69.3)
Effect on health	272 (85.3)
Effect on environment	274 (85.9)
Single use plastic must be banned	
Yes	253 (79.3)
No	66 (20.7)
Items should be banned	
Plastic juice straw	155 (48.6)
Plastic coffee cup	160 (50.2)
Mineral water bottle	148 (46.4)
Food plastic container	131 (41.1)
Plastic bag/ cover	199 (62.4)
Plastic cutlery	152 (47.6)
Plastic plates and cups	159 (49.8)
None has to be banned	31 (9.7)
Willing to replace the following items	
Plastic juice straw	140 (43.9)
Plastic coffee cup	148 (46.4)
Mineral water bottle	121 (37.9)
Food plastic container	109 (34.2)
Plastic bag/ cover	203 (63.6)
Plastic cutlery	152 (47.6)
Plastic plates and cups	151 (47.3)
Not willing to replace any item	3 (0.9)

*Multiple responses

The common occupations reported by the participants were business owners, and shopkeepers.

Regarding knowledge of participants on single use plastics, about 60% of them reported plastic cutlery, plates and cups as single use plastics. Most of them (80%) reported that fish market, supermarket and vegetable market were important sources for plastic bag generation [Table 1]. With reference to the effect of single use plastics, 70% of the participants were aware that plastics cause's harmful effects on health and about 25% knew that it causes respiratory diseases and cancer. More than 95% of the population were unaware that plastic can cause global warming and climatic change in our environment. About 40% were unaware that plastics cause harmful effects on health birds and marine life apart from animals. More than 60% reported that plastic doesn't degrade and 70% of the participants did not know that single use plastic is banned in their area.

As for the attitude of the participants towards single use plastics, 85% of them were concerned about the effect on health and environment [Table 2]. About 80% of them were of the opinion that there should be a ban on single use plastics. More than half (62%) were supporting the ban of plastic bags followed by coffee cups (50.2%), plastic plates and cups (49.8%) and plastic cutlery (47.6%). More than 60% of the participants were willing to replace plastic bags, followed by plastic items such as plastic cutlery (47.6%), plastic plates and cups (47.3%).

Regarding practices on single use plastics, 82.4% of the participants used plastic bags on a regular basis followed by mineral water bottle (32.6%) and food plastic container (24.5%) [Table 3]. It was found that more than half (53.3%) of the study participants used plastic coffee cup occasionally. About 42% reported that they obtained and used 3-5 plastic bags in a week. Majority of the population reported the reasons for plastic use as easily available (76.2%) followed by plastics are cheap and free of cost (58%). It was found that more than 85% of the shopkeepers in and around the area were providing plastic bags to the customers after shopping. Among the participants, 38.2% were using their own non plastic bag for shopping.

DISCUSSION

Socio-demographic profile: The study had 319 participants, whose mean age was 37 years and 74.6% of the respondents were female. Similar age and gender composition was found in a study on plastics conducted by Joseph et al. in Mangaluru.[12] The present study had 62.1% respondents as housewives and all this could be attributed to the fact that the survey was conducted during working hours and most of the men had left for work.

Table 3: Practice of study participants regarding single use plastic (N=319)

Domains	Frequency (n) (%)
Use the item on a regular basis	
Plastic juice straw	0 (0)
Plastic coffee cup	22 (6.9)
Mineral water bottle	104 (32.6)
Food plastic container	78 (24.5)
Plastic bag/ cover	263 (82.4)
Plastic cutlery	22 (6.9)
Plastic plates and cups	19 (6)
None	24 (7.5)
Use the item occasionally	
Plastic juice straw	319 (100)
Plastic coffee cup	170 (53.3)
Mineral water bottle	124 (38.9)
Food plastic container	67 (21)
Plastic bag/ cover	47 (14.7)
Plastic cutlery	146 (45.8)
Plastic plates and cups	164 (51.4)
Number of single use plastic obtained/used in a week	
None	7 (1.9)
01-Feb	62 (19.6)
03-May	134 (42.1)
06-Oct	59 (18.5)
>10	57 (17.9)
Reason for using single use plastic	
Cheap and free of cost	185 (58)
Easily available	243 (76.2)
Convenience	177 (55.5)
Light weight	132 (41.4)
Lack of alternative material	88 (27.6)

*Multiple responses

Knowledge: The study revealed that the knowledge regarding single use plastic was inadequate among the residents of Madani Nagar because most of them did not know that there is a different category called as single use plastic but then when explained about it, most of them said they knew that certain plastic are supposed to be used only once and they could identify the items. Majority of the respondent's recognised juice straw as a single use plastic whereas almost half of the respondents were unable to identify that plastic bag are the same. Fish markets were considered as the major source generating plastic daily as they were unable to find an alternative method to carry it. Majority of them were vaguely aware that single use plastics posed a threat to their health however they were unable to attribute it to a specific cause.

Knowledge regarding environmental hazard was not adequate as reflected by the fact that 95% did not know its effect on global warming and climatic change and also one third of people were not realizing that it affects birds and marine life in a harmful way. This could be attributed to the fact that there was a lack of awareness regarding single use plastics and its harmful effects. These findings are in contrast to a study done by Shetty et al, on solid waste management in a similar setting where they found the majority of the participants were aware about the effects of solid waste on health and environment.[14]

Attitude: Majority of the people, around 80% support the viewpoint that single use plastics should be banned and they are willing to replace single use plastics including plastic bags because they were concerned about the ill effects on health and its environmental hazards. Around 70% of the participants were of the opinion that using plastic bags results in littering and dirtying of environment as the residents by themselves have experienced the same. Similarly, in another study done in Delhi by Abhigyan et al, 57.6% users were willing to ban and replace plastic bags and suggested cloth/jute as an alternative.[15]

A large proportion of study participants supported ban on plastic coffee cup (50.2%) and juice straw (48.6%); on the other hand support for ban on plastic food containers (41.1%) were relatively less because they were reusing the container after consumption of the desirable product as in the form of storing food in the fridge. This was unlike a study done by Racheda Kasemsup et al, among health personnel and parents of children admitted in Queen Sirikit National Institute of Child Health where they noted a large proportion of participants were willing to reduce the use of plastic food containers.[16]

Practice: The majority of the participants in our study used plastic bags on a regular basis because they were cheap or free of cost, easily available and was convenient, which were similar to the findings of a study conducted by Gupta K et al, in Delhi city where 93.8% were using plastic bags regularly.[17] The study finding revealed that there were a small proportion of people who regularly used plastic mineral bottles and food plastic containers. These findings were similar to the study done by Racheda Kasemsup et al, were the participants were using mineral water bottles (17.5%) and food plastic containers (4.5%) on regular basis.[16] This practice is having dual harm as apart from causing environmental pollution, it will also result in increased consumption of microplastics released from the plastic items used to store food and water.[18-19] Items such as plastic straws, plastic cups and plates were used occasionally as these items were utilized by people in places such as a juice shop, coffee shop or a bakery.

More than one third of the participants reported that they use around 3-5 plastic items in a week but few participants have reported that they do not obtain plastic bags on a weekly basis but instead they obtain and use it occasionally once or twice a month. There is a law stating the ban of plastic

bags in Mangalore city but from this study we can point out that the enforcement of that law is poor in and around the rural regions, because the majority of the shops i.e., around 85% offer plastics bags to their customers. This highlights the unawareness about the imposed legislation which may be due to lack of awareness campaigns in disseminating information imposed under this. So it is important for Government to look on and emphasize on law enforcement. These findings were similar to the findings of that of a Mangalore based study conducted by Joseph N, et al where the shopkeepers were supplying plastic bags to customers.[13]

Among the participants about 38.2%, used their own non plastic bags which indicates that only a small proportion of the population are willing to make changes to actually reduce the harm done to the environment.

CONCLUSION AND RECOMMENDATION

The study observed that there was inadequate knowledge regarding single use plastics among the residents of Madani Nagar. Most of the participants were unaware of the different category named single use plastic. It was found that the participants could identify juice straw as a single use plastic but they were unaware than plastic bags belong to the same category. The study population were unaware of hazardous effect to living organisms and to the environment.

Most of them are of the opinion that single use plastic should be banned and they are willing to replace the single use plastic with the alternatives. Attitude is satisfactory towards the ban of plastic coffee cup and juice straw but unsatisfactory towards the plastic food container since the participants were of the opinion that it can be reused to store food in the fridge. The study observed that among the single use plastic items, plastic bags were used on a regular basis since it was cheap or free of cost, easily available and convenient to use.

As the knowledge was poor, awareness about the harmful effects of single use plastics can be achieved by conducting information, education and communication programs in which the students can take initiatives by making posters about the same and also setting up stalls along with conducting informative sessions that can enhance the knowledge among the residents.

As the practices were unsatisfactory, the residents can be recommended to use their own shopping bags other than plastic for their daily use. As the majority of the shopkeepers were still giving plastic bags to their customers, we suggest the Government to strictly enforce the ban on usage of single use plastics.

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