

Drug disposing behavior and awareness of the concept of ecopharmacovigilance among the medical faculty

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ABSTRACT

Background: The ever-increasing impact of drugs on the environment has added an altogether new dimension of monitoring, assessing and documenting the known and unknown drug effects on our fragile environment in the form of ecopharmacovigilance. This study was carried out to document the drug disposing behavior and awareness of the concept of ecopharmacovigilance among the medical faculty of a tertiary care Medical Hospital.

Methods: A detailed, structured, anonymous questionnaire consisting of both open and close ended essential queries on drug disposal practices was prepared and response obtained from the participants which included an agglomeration of teaching faculty and the clinicians of various disciplines of the Institute.

Results: 97.87% of the participants obtained drugs in excess which included a majority of solid (68.12%) and liquid (31.88%) dosage forms. The maximum medicines obtained in excess included analgesics and antipyretics (89.36%), anti-asthmatics (15.22%), and anti-emetics (13.48%). 82.8% of the respondents were unaware of the proper drug disposal technique and 94.7 % of the respondents practiced open disposal of the drugs.

Conclusions: An abysmally low level of awareness about ecopharmacovigilance and unhealthy, irrational method of drug disposal was documented in our study. Appropriate training of those who handle drugs in hospitals and healthcare establishments is the need of the hour.

Keywords: Drug disposal, Ecopharmacovigilance, Healthcare establishments

INTRODUCTION

Ecopharmacovigilance can be defined as science and activities concerning detection, assessment, understanding, and prevention of adverse effects or other problems related to the presence of pharmaceuticals in the environment, which affect human and other animal species.¹

The effect of drug use on the environment has largely been unaddressed. However, of late, the scientists and environmentalists around the world have been focussing

their attention on the impact of drugs on the environment and surroundings.² Drugs both herbal and synthetic have been consumed by the human population for various medical conditions.

A rough estimate provided by certain studies indicates that around 100,000 tons of antimicrobials are consumed every year.³

Statistics from other studies also indicate that around more than 30 billion doses of non-steroidal anti-

inflammatory drugs (NSAIDs) are consumed annually in the United States only.⁴

Rising levels of some drugs can have their adverse effects on the ecosystem. Drugs are usually water soluble and therefore find their way into the sewage. This has added an altogether new dimension of ecopharmacology. In addition, effluents containing the pharmaceutical chemicals from drug manufacturing units have been a growing concern over the recent years. Though such industries adopt the sewage treatment process before disposal but because of their obsolete processes the contamination of environment by drugs continues. Few drugs may not be entirely removed by treatment process leaving their traces to go into water in environment.⁵ Some examples include drugs like oral contraceptives, Cocaine, carbamazepine, and iodine contrast media.⁶⁻⁸ These drugs enter into the environment and the food chain through various routes causing harmful effects on the fragile ecosystem.

The alarming increase in the level of drugs in the ecosystem was conducted first in 1976 that detected drugs in at the Big Blue River sewage treatment plant in Kansas City.⁹

A number of studies have found that hormones, antibiotics, analgesics, tranquilizers, anti-hypertensive drugs like various beta blockers and anticancer drugs that were given therapeutically to humans and animals were present in alarming levels in surface water, groundwater.¹⁰⁻¹⁶ Yet another major concern was the development of antibiotic resistance in pathogens in the environment owing to their continuously persistent exposure. A mechanistic approach to the exposure analysis for environmental risk assessment was proposed by Richard and Cook.¹⁷

Ethinyl estradiol used in oral contraceptive pills and hormonal replacement therapy has adversely affected the population of fish in different water bodies through its feminizing effects on the males.¹⁸

Even the drugs acting on the CNS like Fluoxetine triggering spawning in shellfish and addiction drugs like Cocaine, traces of which was detected in River Thames.¹⁹

The pharmacokinetic and pharmacodynamic characteristics of a drug may also serve as an indicator in the causation of the untoward consequences depending on route of administration. It means that once they are excreted into the environment, they enter food chains and concentrate as they move upward into larger predators.²⁰

The general awareness of the concept of ecopharmacovigilance and the practice of safe disposal of the expired medicines seems to be low in the Indian population. Therefore, this study was conducted to document the awareness of the faculty of the Institute with respect to the concept of ecopharmacovigilance and

safe drug disposal practices with the help of a structured questionnaire.

The objective of the study was to identify and document the drug disposal practices among the faculty of the Institute. To document the knowledge and awareness of the concept of ecopharmacovigilance among the faculty of the Institute

METHODS

The study was conducted during a CME at Sapthagiri Institute of Medical Sciences and Research Center, Bangalore after obtaining the permission from the Institutional Ethics Committee.

A detailed, structured, anonymous questionnaire consisting of having both open and close ended essential queries on drug disposal practices was prepared and response obtained from the participants.

The participants included an agglomeration of teaching faculty and the clinicians of various disciplines in the Institute. A dual objective of sensitizing them about the impact of drugs on the environment at the end of obtaining the responses was also done, which included the essential concepts of ecopharmacology and ecopharmacovigilance. Informed consent was taken before obtaining their responses.

RESULTS

A total of 141 participants consented to mark the study questionnaire.

Table 1: Basic socio-demographic details.

SN	Criteria	Observation
1.	Age	23-61 years
2.	Sex	
	Males	98
	Females	43
3.	Marital Status	
	Married	32
	Unmarried	109

The data collected was analyzed and expressed as counts and percentages. 138 Participants (97.87%) responded that they bought certain medications in excess. This included analgesics and antipyretics (n=126,89.36%), anti-emetics (n=19, 13.48%), oral contraceptive pills (n=5, 3.55%) anti-hypertensives (n=8, 5.67%) antibiotics (n=11, 7.80%) multivitamins/iron preparations (n=12, 8.70%), anti-asthmatics (n=21, 15.22%), antitussives (n= 18, 13.04%) and Anti-diarrhoeals (n=06, 4.35%). It was striking to note that 94.7 % of the respondents practiced open disposal through household trash (Dustbin) of the unused and expired drugs. 82.8% of the respondents were unaware of the proper drug disposal technique.

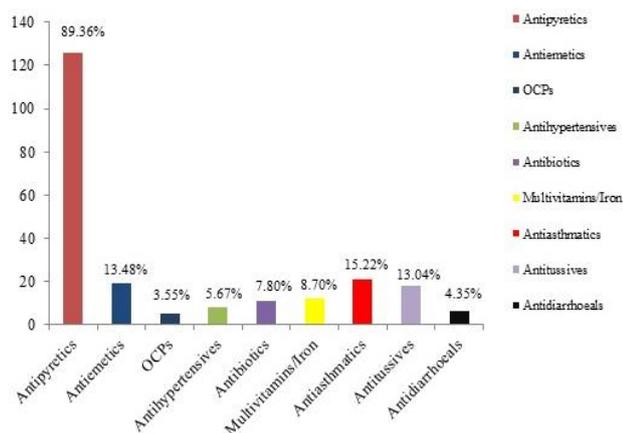


Figure 1: A graphical representation of the drugs used in excess.

The Pharmacy was the major source of buying excess drugs in addition to the physician's samples given by the drug representatives to the doctors. None of the respondents acquired medicines through online shopping.

96.3% of the respondents were unaware of the concept of ecopharmacovigilance. However, it was striking to note that 97.2% of the respondents were aware of the fact of the presence of the drugs in drinking water and milk.

All the respondents expressed concern over the presence of drugs in the drinking water and milk. Sensitization and Awareness on the concept of ecopharmacovigilance was conducted after receiving the marked questionnaire.

DISCUSSION

Pharmaceutical waste in hospital and healthcare establishments could be generated through the unused or partially used dosage forms, outdated drugs or the patient's own medications. A major chunk of medications may get expired which includes the physician's samples or due to inadequacies in the stock management and distribution in the hospital pharmacy. Unwanted leftover and expired medicines can accumulate over a period of time leading to a need for disposal.²¹

In a study conducted by Sasu s et al, it was found that half of the population surveyed confirmed having unused, leftover, or expired medicines at home, and over 75% population disposed them through the normal waste bins, which end up in the landfills or dump sites.²² However, in our study 94.7% respondents reported open disposal of the medications.

In the Indian context, a study conducted by Aditya S, among the dental students in North India, it was found that 70% of students possessed up to five expired medications at home, and the predominant method adopted for disposal was via household trash.²³ A spectrum of medications ranging from antipyretics to

anti-diarrhoeals was procured by the respondents in our study. Antipyretics were followed by anti-asthmatic drugs and anti-emetics. The role of ever rising pollution in a metro city like Bangalore and labeling it as the allergic city of India needs to be underscored with this subtle yet highly noteworthy finding.

Though a number of regulatory bodies like the FDA and the European Union have set some cut-off limit for environmental concentration of drugs, no actual testing is conducted after a drug is marketed to see if the environmental concentration was estimated correctly.

There is a little concern and research to find the adverse effects on environment, of particular drugs given at therapeutic doses. Even in clinical trials, where many limitations like that of limited size, limited population, narrow indications and short duration are observed, it is found that evaluation of drugs on environment is practiced very minimally which is a great warning to the regulatory authorities to take a decision at the earliest.

CONCLUSION

Our study concluded that the general awareness of the medical students and the faculty of the Institute was dimly low with reference to the concept of ecopharmacovigilance and drug disposal practices too were unhealthy. There was a huge gulf in the awareness of the safe disposal practices of the leftover, expired and unused medicines.

The greatest paradox exists when it is found that those who handle drugs in hospitals and healthcare establishments do not receive appropriate training in hazardous biomedical waste management during their academic studies. Appropriate curriculum change attending to the sensitivities of such a crucial and sensitive issue and training on essential training on drug disposal is very essential.

We should therefore permanently instil in the templates of our memory that "we have not inherited our environment from our ancestors, but we have borrowed it from our future generation".

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