



A STUDY ON UNUSED AND EXPIRED DRUG DISPOSAL PRACTICES : KNOWLEDGE AND BEHAVIOURAL PATTERNS AMONG THE RURAL POPULATION

Pharmacology

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ABSTRACT

INTRODUCTION: Unused and expired drugs in the households constitute a dominating cause of environmental contamination with drugs and other health hazards in addition to Industrial waste of the pharmaceutical companies. There are no proper disposal mechanisms being followed in India even we do not have a legislation to follow and to make health care providers accountable.

METHODOLOGY: Around 650 households were surveyed to know about their current practicing methods of drug disposal and also their knowledge on impact of improper drug disposal on health and environment.

RESULTS: Our study shown that nearly 85% of the participants discarded leftover medications by throwing them in the Garbage, while 7% burned in open place and few Respondents 1-2% followed returned to Pharmacy/health facility/friends etc.

CONCLUSIONS : There is an urgent need for creating awareness among the people regarding proper drug disposal mechanisms.

KEYWORDS

Unused medicines, Drug disposal, Environment contamination, Awareness.

INTRODUCTION

Medicines have vital role in treatment and prevention of disease in both humans and animals. There has been an escalating use of medicines in both human and veterinary population and it is almost in sync with the notion of "a pill for every ill". According to one estimate 1 lakh tons of antimicrobial agents are consumed every year.^[1] More than 30 billion doses of Non steroidal anti inflammatory drugs (NSAIDs) are consumed annually in the United States only^[2].

We do not have official data on consumption of different medicines in our country but definitely the scenario would be more dangerous as India is one of the largest Consumer of pharmaceuticals in the world. The Consumed drug passes out of the system either as metabolites or unchanged through excretion. Drugs are usually water soluble and therefore find their way into the sewage.

Unused and expired drugs in the households constitute a dominating cause of environmental contamination with drugs in addition to Industrial waste of the pharmaceutical companies. Improper disposal of leftover medication usually contaminates the environment to a great extent. Few drugs are not entirely removed by treatment process leaving their traces to go into water in environment^[3]. Cocaine, oral contraceptives, carbamazepine, and iodine contrast media are some of the examples^[4]. Apart from these, there are numerous examples of drugs found in aquatic environment like flouroquinolones, hormones, paracetamol, diclofenac, etc. Thus water becomes contaminated and it leads to an unwitting re-entry of drugs into humans example development of Antimicrobial resistance.

Majority of households dispose the leftover medicines in toilets and dustbins^[5]. There is no proper disposal mechanisms are being followed in India which lead to development of aforementioned health consequences and environmental contamination^[6]. There is an urgent need for creating awareness among the people regarding proper drug disposal mechanisms and to curb the entry of medicines into the environment. At this juncture our study definitely will play key role in sensitizing the rural masses.

AIMS & OBJECTIVES:

1. To Know the current practicing methods of drug disposal in rural areas.
2. To Evaluate the knowledge and behavioural patterns of rural population.
3. To Educate them about the safe drug disposal.

MATERIALS AND METHODS:

The study was conducted after obtaining approval from the Institutional Ethics Committee, in rural areas near by Government Medical College/General hospital, Nizamabad, Telangana. We have

made field visits to the households of different villages and inquire them about their knowledge and behavioural patterns on leftover drug disposal methods.

Inclusion criteria:

1. We included only the households willing to share the information
2. Households of Rural villages

Exclusion criteria:

1. Households not willing to share the information
2. Households of Urban areas

Around 650 households had been surveyed to know about their current practicing methods of drug disposal and also their knowledge on impact of improper drug disposal on health and environment.

The aforementioned details were collected based on the questionnaire as mentioned below:

- a. Number of patients receiving the medicines in the household/ Diagnosis/ disease
- b. Type of medication OTC/Prescription
- c. Dosage formulations
- d. Current practice of leftover drug disposal patterns: Flushing in toilet, Burning in open place, disposal along with routine household garbage, any other methods etc.
- e. Assessing their knowledge on safe disposal of leftover medicines: Giving back to pharmacy^[8,9] or any other centres as specified by the Government/Regulatory authorities/NGOs, Incineration or any other methods they have known. Finally we would like to know about their awareness on medication take-back programs^[7], medication mail-back programs, and collection receptacles for medication disposal.
- f. Behavioural patterns: would they follow safe disposal methods after explaining the detrimental effects of inappropriate disposal of medicines on health and environment.

RESULTS:

We generated the data from the 650 households during February-March Months of the year 2019. We found there were total 728 patients and we observed the Medicaments and relevant case records of them. Our study shown the following results, when we observed the demographic profile of the patients the study revealed that female patients were more in number (53.84%) compared to male patients (46.15%). With regard to age group majority of patients (26.78%) were belonged to 46-60 years age group, then 23.76%, 18.95%, 13.18%, 11.53%, 5.76% belonged to 31-45 years, 61-75 years, 1-15 years, 16-30 years, >75 years age group, respectively (Table 1 and Table 2), explain the aforementioned observations. Demographic profile of the participants:

Table No.1. Gender wise distribution of the patients.

	Sex distribution	No. of patients	%
1	Males	336	46.15
2	Females	392	53.84

Table No.2. Age wise distribution of the patients.

	Age group (Yrs)	Number	Percentage
1.	1-15	96	13.18
2.	16-30	84	11.53
3.	31-45	173	23.76
4.	46-60	195	26.78
5.	61-75	138	18.95
6.	Above 75	42	5.76

When comes to the Drug disposal practices the Majority of respondents (622) 85.43% of them following disposing the leftover Medicines in the Garbage/ Trash along with their routine household waste. Around (28) 3.84% of them are flushing down the medicaments in the sink/toilet, (52)7.14% respondents are Burning the Unused medicines in open space, and (12)1.64% of them are said they have had known about returning to Pharmacy but never practiced,8(1.09%) of them were given to their friends, 6 (0.82%) of them were never disposed.

Regarding their knowledge on the different methods of drug disposal : very less number of respondents 16.62% of them are known about the correct method of drug disposal and handing leftover medicines to the pharmacy or other related Health facility, Incineration, Medication take back Programmes and Medication mail back programmes etc. Remaining household respondents around 83.37% were said they never heard of these Methods or programmes. Even the Majority of people told they never been guided by any Pharmacy people/health care providers to follow the safe practice for disposal of leftover medicines. Table No. 3 and 4. Explain the aforementioned details.

Table No.3. Leftover drug Disposal patterns

	Disposal Practices	Respondents (No.)	%
1	Thrown away in the Garbage/Trash	622	85.43
2	Flushed down the sink/toilet	28	3.84
3	Burned in Open place	52	7.14
4	Returned to a Pharmacy/Clinic	12	1.64
5	Given away to NGOs/ other health facility/ friends	08	1.09
6	Stored/ never disposed	06	0.82

Table. no. 4. Knowledge on other drug disposal patterns:

	Knowledge on	No.	%
1	Giving back to Pharmacy	36	4.94
2	Giving back to any other Facility/NGOs	28	3.84
3	Incineration	19	2.6
4	Medication Mail back Programmes	16	2.19
5	Medication take back Programmes	22	3.02

DISCUSSION:

Our study shown that nearly 85% of the participants discarded leftover, expired, unwanted, or unused medications by throwing them in the garbage or trash while 5% believed that giving leftover medications away to family, friends, or charity centers is the better method of disposal. These findings are little higher when compared to other studies. The number of respondents in Riyadh and Kuwait who disposed their medication in the trash was found to be 79% and 77%, respectively^{110,111}. The survey conducted in Lithuania reported that 50 % of countryside residents dispose of unused drugs by burning them with the rest of the household waste. In the United Kingdom (UK), more than 60% of respondents discarded unwanted medications in the trash, and 22% returned them to a pharmacy¹¹². But it is only around 1-2% of participants returned their leftover medicines to Pharmacy in our study.

In a study conducted in USA in 2006, more than one half of participants had reported flushing medications down the toilet (53.8 %), in our study it was only 4%. The practice of burning unused drugs was also reported in Ghana (>10 %) and Nigeria (9.9 %) and in rural households in Serbia (14.9 %) and it was around 7% in our study.

Majority of studies reported rubbish bin as the predominant method of disposal for unwanted residential medication. If the trash is incinerated, this may be the environmentally safe way of medication

disposal, but if the waste is landfilled, this only delays the entry of pharmaceuticals to aquatic environment. In the case of the household waste being taken to the landfill sites, pharmaceutically active compounds enter the landfill effluent, possibly contaminating surrounding surface or ground waters¹¹³. The biggest environmental impact of medication disposal into garbage can be expected in countries where landfilling is a predominant (if not the only available) option for municipal waste management¹¹⁴.

The most common reason for not returning medications to pharmacies or other collection sites was lack of information and awareness on the existence of available unwanted medication collection schemes in the community^{115,16}. Most of the people have never heard about such a possibility and do not know anything about the issue.

In general, more than 90% of respondents across all study areas said they never received information for the proper and safe disposal of medications. Thus, healthcare providers should step in educational programs for proper and safe disposal of medication and provide this information to patients when they visit the health care facility. Pharmacists have a major role in providing proper information concerning safe disposal of medications.

Public education is the key to the current problem. If pharmacists provide information on disposal during medication counseling, the patient will develop positive disposal practices. We need to organize collaborative, nationwide, and awareness campaigns utilizing social media to create awareness among the people. In USA, they have a well-established national program for safe disposal of expired prescription drugs through the Drug Enforcement Administrations' (DEA) National Prescription Drug Take Back Initiative. They organize Drug Take Back events to promote proper drug disposal.

These international guidelines are available as guidance and provide recommendations on proper and safe disposal of leftover medications. Having a national policy for disposal will be a major influence on people's disposal attitude and practices. A take back program will provide timely disposal methods and may lessen likelihood of medication waste going through the sewage system, and hence environmental pollution may be prevented.

Need of the hour is to concentrate on the take back initiative program first and then spread public awareness for the consequences of the current disposal methods on personal health and on the environment. This might bring positive results in curbing the present disposal practices.

CONCLUSIONS:

Improper disposal of unused and expired medicines becoming a Global problem specially in developing countries like India it is much more because of poor regulation of health sector and significant part of population is illiterate. This trend of improper disposal is having various ramifications on health of humans, animals and even on other organisms.

We need to generate data which gives us a complete picture of drug disposal patterns in India and its impact on our health and ecosystem. To make this happen there has to be a systematic evaluation of the same throughout our country. Need of the hour is to create awareness among the people regarding the safe disposal of unwanted leftover medicines and how it is causing havoc in health care system and environment. Government, NGOs and health care personnels must work in tandem to influence the people to follow the safe disposal of unwanted medicines by utilising medication take-back programs, medication mail-back programs etc.

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