

“HOUSEHOLD DISPOSAL OF PHARMACEUTICALS” A RISK TO THE ENVIRONMENT (A SURVEY)

Manjul P. Singh*, Gulzar Alam, Anita Singh, Upendra Kumar

Affiliated to:

Shri Leuva Patel Trust Pharmacy Mahila College, Amreli, Pin-365601– Gujarat (India)

ABSTRACT

The presence of pharmaceuticals are the nearly ubiquitous pollutants in both ground and surface waters environment, has become a cause for increasing concern in recent years. This study aimed to investigate the household disposal of unused and expired pharmaceuticals as a source of pharmaceuticals in the environment. The survey was carried out in major cities i.e. Ahmedabad, Gandhi Nagar, Amreli, Rajkot, and Vadodra of Gujarat state. We used the information on when and how they disposed of unfinished pharmaceuticals to construct a conceptual model to assess the pathways of pharmaceuticals into the environment. The model demonstrated that disposal of unused pharmaceuticals, either by household waste or via the sink or toilet, may be a prominent route that requires greater attention. This survey reveals important data regarding awareness, economics and other aspects regarding the use of household pharmaceuticals. So, overall conclusion of survey that the household disposal of pharmaceuticals among peoples in different place in Gujarat is very harmful for the environment and human health.

Keywords: Pharmaceuticals, Pollutants, Household Disposal, Sink or Toilet

*Corresponding author:

Email: singh_manjul@rediffmail.com

1.0 INTRODUCTION

Pharmaceuticals are produced and used in increasingly large volumes every year. With this growth comes concern about the fate and effects of these compounds in the environment¹. As methods for detection have improved², scientists have established pharmaceuticals as nearly ubiquitous pollutants in both ground and surface waters^{3,4,5}. There are two main routes for pharmaceuticals to enter the environment⁶. The first is via the effluent from wastewater treatment works (WWTWs) after excretion from the body. When people take medication, only a fraction is completely absorbed by the body, and the excess is excreted as unchanged compounds or processed metabolites. With septic systems, pharmaceutical compounds leach directly into ground water. With municipal sewage, the compounds make their way to sewage treatment facilities that are not equipped to degrade medicinal substances. The result is wastewater effluent that contains various degrees of pharmaceutical waste, much of which goes undetected because water districts and sewage treatment facilities are not required to test for pharmaceuticals⁷.

The second route by which pharmaceuticals can enter the environment is by the disposal of out-of-date or unwanted medicines, which may occur via the sink/toilet/drainage⁸ or in household waste that is then taken to landfill sites. A source of

concern is that, at the pharmacies questioned, 68% of unreturnable medicines were disposed of in nonhazardous waste or via the drain⁹. Traditionally, disposal advice to consumers has been limited to flushing down the toilet or, in some cases, burning or grinding and discarding in household waste but emerging environmental concerns mean that this is sometimes modified. People are first advised to check whether local pharmacies or doctors are able to receive returns or whether hazardous waste facilities exist in the area. As a last resort, disposal in household waste is deemed to be less harmful than disposal via the sewage system. The aim of the present study was to identify and assess the significance of the different pathways of pharmaceuticals from the household to the environment. Knowledge of the motivation behind different disposal methods is useful in the management of the release of pharmaceuticals in the environment and in the assessment of the associated risk.

2.0 Method:

Pharmaceuticals are a large and varied class of chemical compounds with diverse properties and applications. A survey was devised to investigate disposal patterns of the household pharmaceuticals in major cities (Ahmedabad, Gandhi Nagar, Amreli, Rajkot, and Vadodra) of Gujarat state. The minimum sample size was not less than 250 persons for each city. Respondents

were asked whether they ever had any of the types of medicines and when and how they disposed them. Information about the age, sex and education of the respondent in order to assess socioeconomic status was collected. The questions pertaining to disposal practices of pharmaceuticals and awareness were relatively straightforward. We asked respondents, How do you typically get rid of unwanted or expired medicines or over-the-counter medications in your household? Response categories, from which they could choose one, included household waste (A1, return to pharmacy (A2), hazardous/municipal waste centre (A3), sink/toilet (A4) or other (A5). We considered the first priority answer of the respondents.

3.0 Result and discussion:

The survey was carried out in major cities i.e. Ahmedabad, Gandhi Nagar, Amreli, Rajkot,

and Vadodra of Gujarat state. Survey included 358 persons from Ahmedabad, 266 persons from Gandhi Nagar, 433 persons from Amreli, 280 persons from Rajkot and 278 persons from Vadodra. The minimum sample size was not less than 250 persons.

The persons were also spread evenly across age ranges and family types. Almost everyone (98.5%) had some type of pharmaceutical in their house; most (62.2%) had a mixture of over-the-counter (OTC) and prescription medicines, whereas 33.5% had only OTC medicines and 10.1% had only prescription medicines. Responses indicate that just more than half (60.1%) finish their medication and hence have none to dispose of. Around a third (25.3) keeps them until the expiration date, and 14.3% dispose of them when the treatment has been completed.

TABLE : Disposable characteristics based of personal interviewed

Disposal Codes	Ahmedabad	Gandhi Nagar	Amreli	Rajkot	Vadodra	No. of persons	% of persons
(A1)	197	146	246	149	147	885	55.7
(A2)	25	17	34	21	22	119	7.41
(A3)	16	10	25	18	16	85	5.30
(A4)	115	80	122	82	83	482	30.03
(A5)	5	3	6	10	10	34	2.12

A1=Household waste, A2=Return to pharmacy, A3=Hazardous/municipal waste centre, A4=Sink/toilet, A5=Other

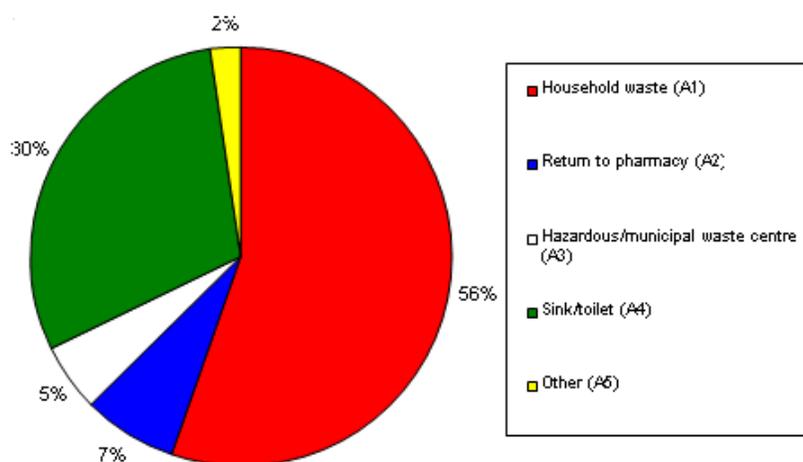


FIGURE: Person’s usual disposal methods for pharmaceuticals

An investigation into the disposal habits of the public found that only 7.4% of the people they surveyed returned unused medication to the pharmacy, whereas 55.7% threw them away as household waste and 30.1% disposed of them in the sink/toilet. A small number took them to municipal waste sites (5.3%) that sometimes have special waste facilities and very few population (2.1%) disposed by other means.

The division between the use and disposal of drugs is based on responses from subjects who said they finished the prescription and therefore had nothing to dispose of and those who said they disposed of drugs at another time (e.g., when the drug expired). The main assumption was that subjects who said that they had some medicine to

dispose of first consumed 50% of the prescription, disposing of the remaining 50%.

4.0 Discussion:

The most straightforward way to eliminate the risk posed by the disposal pathway would be to reduce the quantity of drugs being improperly discarded. One possibility is to increase the prominence of product labeling and the provision of stronger advice on how to dispose of any remaining drugs. The results of the survey showed that, 55.7% peoples were disposed the pharmaceuticals as household waste, 30.1% disposed of them in the sink/toilet and very few peoples were (7.4%) returns the medicines to pharmacy after completion the treatment. Such disposal habits of pharmaceuticals directly or indirectly enters into the environment as

pollutants except those pharmaceuticals which were return to pharmacy. Most Indian population is not aware about the disposal of pharmaceuticals and disposal habits, due to lack of patients counseling.

5.0 Conclusion:

The overall conclusion of the survey that the household disposal of pharmaceuticals among people is very harmful for the environment and human health. The pharmacist may play an important role in safe disposal of household pharmaceuticals by counseling the people or community about disposal of household pharmaceuticals.

References:

1. Matthew K, James K, Kaleena W, Crispin W and Margaret Z. Pharmaceuticals in wastewater: Behavior, preferences, and willingness to pay for a disposal program. *Journal of Environmental Management*, 2009; 90: 1476–1482.
2. Ternes T.A, Joss A, Siegrist H. Scrutinizing pharmaceuticals and personal care products in wastewater treatment. *Environmental Science and Technology*, 2004; 38; 20: 392–399.
3. Furlong E T, Meyer M T, Thurman E M, Kolpin D W, Zaugg S D, Buxton H T. Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999–2000: A national reconnaissance. *Environmental Science and Technology*, 2002; 36; 6: 1202–1211.
4. Nors N S, Lanzky P F, Ingerslev F, Halling S B, Holten L H C, Jorgensen S E. Occurrence, fate and effects of pharmaceutical substances in the environment – a review. *Chemosphere*, 1998; 36; 2: 357–393.
5. Roberts, P.H., Thomas, K.V. The occurrence of selected pharmaceuticals in wastewater effluent and surface waters of the lower tyne catchment. *Science of the Total Environment* 2006; 356; 1–3: 143–153.
6. Jonathan P. Bound. *Environmental Health Perspectives*, December 2005; 113: 1705–1711.
7. NACWA. National Association of Clean Water Agencies. Pharmaceuticals and personal care products in the environment: a white paper on options for the wastewater treatment community. 2005
8. Health Canada. Proper Use and Disposal of Medication. September 2007.
9. Pray WS and Pray JJ. Childhood poisoning. What should be done? *US Pharm*. 2004; 29: 3.

