



PATIENT'S OPINION AND PRACTICE TOWARD UNUSED MEDICATION DISPOSAL: A QUALITATIVE STUDY

Gupta Dharmender¹, Gupta Ashutosh¹, Ansari N. A², Ahmed Q.S³

¹Post Graduate Student, Department of Pharmacology Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, U.P, India

²Professor, Department of Pharmacology Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, U.P, India

³Associate Professor, Department of Pharmacology Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, U.P, India

*Corresponding Author Email: drdharmendergupta@gmail.com

DOI: 10.7897/2277-4572.02574

Published by Moksha Publishing House. Website www.mokshaph.com

All rights reserved.

Received on: 06/05/13 Revised on: 08/10/13 Accepted on: 10/10/13

ABSTRACT

This study was conducted to explore the opinion and practice toward disposal of unused medication among patients in Shri Ram Murti Smarak Institute of Medical Sciences. An in-depth interview conducted during the period from October 2012 until December 2012. A total of 56 patients participated in this study. Once the participants identified, an appointment was fixed to conduct the interview with them. Due to the small sample size the data were analyzed manually. The most common diseases reported among the participants were hypertension 39.3 % and diabetes mellitus type II 21.4 %. There were three main frequent disposal methods practiced by the respondents, the majority of them threw unused medication into the trash 57.1 %, followed by burning the unused medication 14.2 %. The majority of the participants 60.7 % mentioned that the best way to educate the public about disposal unused medication is through advertisements, treating consultants, patient awareness workshops, pharmacists on medical stores and public campaign. The most method to dispose unused medication among patients is a throw of unused medication into the trash.

Keywords: Opinion; Patients; Practice; Unused medication; SRMSIMS

INTRODUCTION

Usually patients may not use all the medications dispensed to them because of many reasons: they may be avoiding unpleasant side effects; the symptoms have been relieved; forgetfulness; dosage changes; side effect intolerance; or medications reaching the expiration date. Unused and expired medications are likely managed in a wide variety of ways. Keeping expired medications in the home or giving them to friends and family which may increase the risk of accidental or inappropriate ingestion. World Health Organization (1999)¹ reported that unexpired and unused medications are considered unsuitable for drug donations. Other methods of disposal of unwanted medications are by rinsing them down a sink, flushing them down a toilet, or throwing them in the trash². Another method also is to return unused medication to the pharmacy. However, a few pharmacists will take unused and expired medications back to facilitate proper disposal of them, the majority will not³. There are economic burden and environmental effects of unused medication. Regarding the environmental effects of unused medication, studies indicated that the existence of pharmaceuticals and their metabolites in water has been recognized as potentially dangerous^{4,5}. Numerous medications have been found in trace amounts in groundwater⁶⁻⁸, surface bodies of water⁹⁻¹¹ and treated drinking water¹²⁻¹⁵. Medicine environmental contaminations contribute to development of antibiotic resistance in the environment, or exposure of populations to irritant or mutagenic anticancer drugs¹⁶ and the possible link between endocrine disrupting compounds and falling fertility¹⁷. Few studies indicated that even trace levels of many of these compounds can have a detrimental effect on the environment by affecting aspects of biological activity^{18,19}. Concentrations of unused pharmaceuticals compounds may be responsible for environmental effects such as vitellogenin induction in male fish²⁰, gender and genital abnormalities in fish^{21,22} and

even population collapse²³. Some studies suggested that these chemicals can also affect human cells exposed in laboratory settings²⁴. European studies reported that trace levels of pharmaceuticals elements were detected in environmental samples, including sewage effluent, surface water, groundwater, and drinking water^{4,25-28}. Eliminating the wastewater system as means of unused drug disposal is one of many ways to lessen the impact of pharmaceuticals on the aquatic environment²⁹. Regarding the economic burden of unused medication, in the United Kingdom, it has been estimated that around £37 million worth of unwanted medicines are in people homes³⁰. In the United States, the value of unused medicines has been placed at over \$1 billion per year for elderly patient's alone³¹ and in Texas. Garey *et al.* (2004)³² estimated that annual wastage of medicines was US\$106 million per year. A study from Saudi Arabia found that a quarter of medicines kept in the home to be expired, unused or deteriorated with an average value of US\$10 per person³³ indicating that medicine wastage is also a significant problem in Gulf Arabic countries. It is important to remember that these unused medications include analgesics, antibiotics and agents that act on the central nervous system. It is important also to understand why this medication accumulates in order to reduce the potential impact to the environment, potential for diversion and to reduce healthcare spending³⁴. Even though developed countries do not have a water system that can remove the pharmaceuticals elements. In USA, the current water treatment systems do not remove many pharmaceuticals elements from drinking water^{5,35}. Usually the concentration of these medications is negligible; however, long-term exposure to low levels of multiple medications could be hazardous^{15,29,36}. Excretion, through urine and feces, is the primary way in which medications and their metabolites enter the water system. The improper disposal of unused and expired medications represents

another easily preventable source of pharmaceuticals entering water supplies. It is common to find that the unused portions of medicines and tablets prescribed are left on shelves in the houses long after the need for them is ended. In India, the extent of the problem of unused or expired medicines in the home and public disposal practices are largely unknown. This study was conducted to explore the opinion and practice toward disposal of unused medication among the patients attending the various Out Patient Department and patients admitted in various In Patient departments.

Methodology

This was an in-depth interview qualitative study conducted during the period from October 2012 until December 2012. A total of 56 patients from different OPD and IPD of SRMS IMS participated in this study. The ethical clearance was taken from institutional ethical clearance committee. Once the participants were identified an appointment was fixed to conduct the interview in the visitor room of the hospital. Before interviewing the participant, the purpose of this study was introduced and verbal consent was obtained from the participants. The questions consisted of socio-demographic characteristics and the type of the disease. Then questions about their opinion and practice toward disposal of unused medication were asked which are: Have you heard about proper disposal of unused medication, How you dispose your unused medication. Do your medical practitioner tell you how to dispose the unused medication, you know the effect of improper disposal of unused medication to environment, in your opinion, what is the best way to manage unused medication and what is the best way to educate the public about unused medication. The interview talked approximately 40-60 minutes. Due to the small sample size the data analyzed manually.

RESULTS

A total of 56 patients participated in this study. The majority of them were male 53.6 %. The most common disease reported among the participants was hypertension (39.3 %), followed by diabetes mellitus type II (21.4 %), gout (10.7 %), and depression (7.1 %), others such as Parkinson (3.6 %), cancer (3.6 %), renal failure (3.6 %), blepharospasm (3.6 %), pneumonia and migraine (3.6 %)

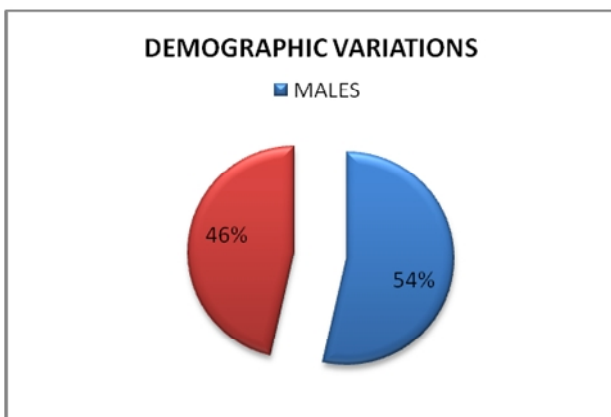


Figure 1: Demographic Variation during the Study Period

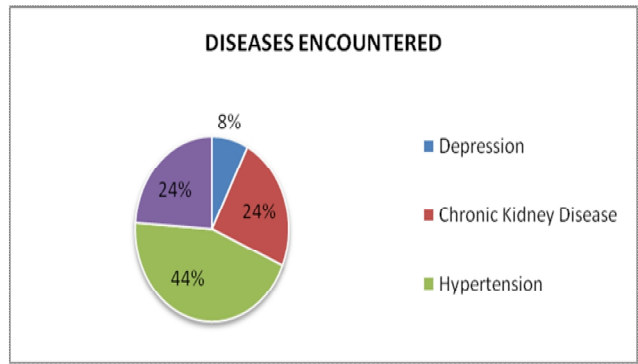


Figure 2: Percentages of Types of Diseases Encountered during the Study Period

Practice of Unused Medication Disposal among Participants

There were three main frequent methods practiced by the respondents, the majority of them threw the unused medication into the trash 32 (57.1 %), followed by 8 (14.2 %) of the participants burnt the unused medication, 3 (5.3 %) said that they have returned the unused medication to hospital, 2 (3.6 %) buried in the ground and 2 (3.6 %) flush it down the toilet, 3 (5.3 %) of the participants did not dispose the medication at all.

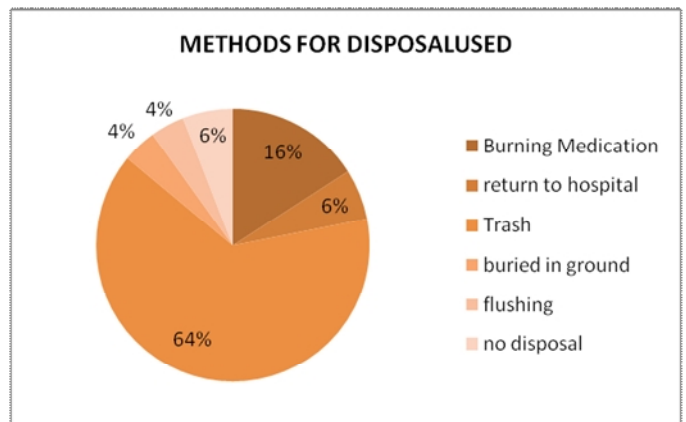


Figure 3: Methods used for Disposal of Unused Medications

Health Care Workers and Proper Way to Dispose Unused Medication

Most of the respondents 95 % mentioned that they were not informed about the proper way to dispose the unused medication by their physician or pharmacist.

Knowledge about the Bad Effect of Improper Disposal of Unused Medication

The majority of the participants 55 % mentioned that they did not know the bad effect of unused medication. The reason given by the respondents that they believed that all the medication did not give any bad effect to human or environment because it was a medicine used to heal disease and would not cause any harm. About 45 % of them mentioned that they know the bad effect of improper disposal of unused medication. The bad effects mentioned by some respondents were poison, pollution, drug abuse, and overdose.

Opinion about How to Educate the Public Regarding unused Medication

The majority of the participants 67.7 % mentioned that the best way to educate the public about disposal unused medication was through schools, universities and public campaign. Some participants mentioned that educating the physicians about the disposal of unused medication was the best way to spread the knowledge among the patients. Two of the participants 3.6 % suggested that employing the drama to educate the public about unused medication. Educate pharmacist 3.6 %, pharmaceuticals companies should put the correct steps to dispose unused medication on box or the cover of the medicine 3.6 % and establish recycle unit for unused medication 3.6 %. Some of them said: Government should make a campaign and teach the public the right way to dispose unused medication starting from school level, universities level and community. Pharmaceuticals companies should put the correct steps to dispose unused medication on every medication box and cover. Educate the public through advertisement in the newspaper and through the drama. Government should establish unit to recycle the unused medication.

DISCUSSION

This study showed that the majority of the participants 57.1 % threw the unused medication into the trash. Where no system exists for unused medication collection in India, disposal of medication in garbage destined for landfill is accepted as more environmentally friendly than flushing them down the drains^{3,29}. Similar finding reported by Kuspis and Krenzelo² was that more typical disposal methods were throwing unused medication out in the trash (54 %). A study conducted by Statistics Canada (2005)³⁷ reported that about a quarter of Canadian households generated leftover medications. Of the households with unused medications, the portion that continued to practice disposal via the sewer, trash, or burial was significant, ranging from 20-70 %. Similar study from Kuwait showed that three quarters of respondents reported that they discarded unwanted medicines in the trash³⁸. A study in 2005 showed that 63 % of the respondents in UK discarded unused medications in the household waste, 11 % emptied them into the sink or toilet and 22 % returned them to a pharmacy³⁹. A recent study from New Zealand showed that between 13 and 24 % of medications were returned to a pharmacy⁴⁰. Opposite finding reported in a recent Swedish study that no one of the study participants flushed the drugs down the drain⁴¹. This might be due to that the pharmacists in Sweden supply special transparent plastic bags with informational text where unused drugs preferably should be placed⁴². Opposite finding reported from Canadian study that 46 % of the respondents disposed unwanted medication down the drain⁴³. The differences in the above studies may reflect the disparity between regulations and advice in the different regions. In this study, the majority of the participants 60.7 % mentioned that the best way to educate the public about disposal unused medication was through schools, universities and public campaign. Similar study reported that mass-media campaigns tended to be more effective in educating and empowering populations. Similar study reported that involvement of the Pharmaceutical Associations would be essential and public education through the mass media³⁸. The results of this study suggest that there is a role for patient education on the proper disposal of unused and expired medications. Previous

education was highly associated with the prior return of medications to a pharmacy or a provider for proper disposal. Since frequent visits to the pharmacy were associated with previous returns to a pharmacy and currently being on more medications was associated with previous return to a provider, patient education may be a factor. Any visit to the pharmacy can provide opportunities for patient education. There are several possible ways that this education could be conducted. For example, providers and pharmacy personnel could discuss medication disposal with patients, and written education could be distributed with medications in a manner similar to what was described above. Or, innovative solutions, such as placing disposal information on medication labels or pill bottles, might prove effective²⁹. Future research should focus on how to most effectively educate patients on proper disposal techniques.

Limitation of the Study

The limitation of this study is natural in qualitative study designs; its purpose was not to generalize the present findings to the general population. Instead, this qualitative method provided an in-depth meaning of the perceptions of patients toward unused medication disposal. Another limitation of this study is that the conclusion and recommendations were based on stakeholder (consumers) without considering other involved parties such as government and pharmaceutical industry. Further quantitative and qualitative studies involving government and pharmaceutical industry are needed.

Recommendation

Government should establish pharmaceutical collection programs to reduce the quantity of unused and unwanted medicines entering the environment and reduce the amount of drugs available for diversion, theft, or accidental poisoning. Health care workers and public education regarding unused medication are needed. National guidelines on the appropriate disposal of unwanted household medicines need to be prepared and disseminated to the public.


CONCLUSION

This study showed that the majority of the participants did not know the bad effect of unused medication. The most method to dispose unused medication among Malaysian patients is a throw unused medications into the trash. The majority of the respondents mentioned that they did not inform about the proper way to dispose the unused medication by their physician or pharmacist.

REFERENCES

1. World Health Organization: Guidelines for Drug Donations. Geneva, WHO; 1999.
2. DA Kuspis and EP Krenzelo. What happens to expired medications? A survey of community medicine disposal, *Vet. Hum. Toxicol* 1996; 38: 48-49. PMID:8825752
3. SK Boehringer. What's the best way to dispose of medications? *Pharmacist's Letter/Prescriber's Letter* 2004; 20: 200415.
4. T Heberer. Occurrence, fate, and removal of pharmaceutical residues in the aquatic environment: a review of recent research data, *Toxicol. Lett* 2002; 131: 5-17. [http://dx.doi.org/10.1016/S0378-4274\(02\)00041-3](http://dx.doi.org/10.1016/S0378-4274(02)00041-3)
5. B Woodhouse. Pharmaceuticals and other waste water products in our waters: a new can of worms?, *Southwest Hydrology* 2003; 30: 12-13.
6. S Rodriguez Mozaz, MJ Lopez De Alda and D Barcelo. Monitoring of estrogens, pesticides and bisphenol A in natural waters and drinking water treatment plants by solid-phase extraction-liquid chromatography-mass spectrometry, *J. Chromatogr. A* 2004; 1045: 85-92. <http://dx.doi.org/10.1016/j.chroma.2004.06.040> PMID:15378882

7. T Scheytt, P Mersmann, M Leidig, A Pekdeger and T Heberer. Transport of pharmaceutically active compounds in saturated laboratory columns, *Ground Water Monit Remediat* 2004; 42: 767-773.
8. IM Verstraeten, GS Fetterman, MT Meyer, T Bullen and SK Sebree. Use of tracers and isotopes to evaluate vulnerability of water in domestic wells to septic waste, *Ground Water Monit. Remediat* 2005; 25: 107-117. <http://dx.doi.org/10.1111/j.1745-6592.2005.0015.x>
9. D Ashton, M Hilton and KV Thomas. Investigating the environmental transport of human pharmaceuticals to streams in the United Kingdom, *Sci. Total. Environ* 2004; 333: 167-184. <http://dx.doi.org/10.1016/j.scitotenv.2004.04.062> PMID:15364527
10. AL Batt, IB Bruce and DS Aga. Evaluating the vulnerability of surface waters to antibiotic contamination from varying wastewater treatment plant discharges, *Environ. Pollut* 2006; 142: 295-302. <http://dx.doi.org/10.1016/j.envpol.2005.10.010> PMID:16324772
11. ST Glassmeyer, ET Furlong, DW Kolpin, JD Cahill, SD Zaugg, SL Werner, et al. Transport of chemical and microbial compounds from known wastewater discharges: potential for use as indicators of human fecal contamination, *Environ. Sci. Technol* 2005; 39: 5157-5169. <http://dx.doi.org/10.1021/es048120k>
12. CG Daughton. Pharmaceuticals as environmental pollutants: the ramifications for human exposure. In: K Heggenhoughen and S Quah (eds.), *International Encyclopedia of Public Health*, Academic Press, San Diego 2008; 5: 66-102. (encyclopedia)
13. SA Snyder, EC Wert, H Lei, P Westerhoff, and Y Yoon. Removal of EDCs and pharmaceuticals in drinking and reuse treatment processes, *Awwa Research Foundation*; 2007. p. xxxii.
14. PE Stackelberg, J Gibs, ET Furlong, MT Meyer, SD Zaugg and RL Lippincott. Efficiency of conventional drinking-water-treatment processes in removal of pharmaceuticals and other organic compounds, *Sci. Total Environ* 2007; 377: 255-272. <http://dx.doi.org/10.1016/j.scitotenv.2007.01.095> PMID:17363035
15. CA Smith. Managing pharmaceutical waste: what pharmacists should know, *J. Pharm. Society. Wisconsin*; 2002. p. 17-22.
16. RJ Slack, JR Gronow and N Voulvoulis. Household hazardous waste in municipal landfills: contaminants in leachate, *Sci. Total. Environ* 2005; 337:119-137.<http://dx.doi.org/10.1016/j.scitotenv.2004.07.002> PMID:15626384
17. JB Bound, K Kitsou and N Voulvoulis. Household disposal of pharmaceuticals and perception of risk to the environment, *Environ. Toxicol. Pharmacol* 2006; 21: 301-307. <http://dx.doi.org/10.1016/j.etap.2005.09.006> PMID:21783672
18. OA Jones, N Voulvoulis and JN Lester. Potential impact of pharmaceuticals on environmental health. *Bull. WHO* 2006; 81: 768-769.
19. MS Kostich and JM Lazorchak. Risks to aquatic organisms posed by human pharmaceutical use, *Sci. Total. Environ* 2008; 389: 329-339. <http://dx.doi.org/10.1016/j.scitotenv.2007.09.008> PMID:17936335
20. JP Nash, DE Kime, LTM Van Der Ven, PW Wester, F Brion, G Maack, et al. Long-term exposure to environmental concentrations of the pharmaceutical ethynylestradiol causes reproductive failure in fish, *Environ. Health. Perspect* 2004; 112: 1725-1733. <http://dx.doi.org/10.1289/ehp.7209> PMID:15579420 PMID:15579420 PMCid:PMC1253666
21. GT Ankley, KM Jensen, MD Kahl, JJ Korte, and EA Makynen. Description and evaluation of a short-term reproduction test with the fathead minnow (*Pimephales promelas*), *Environ. Toxicol. Chem* 2001; 20:1276-1290.[http://dx.doi.org/10.1897/15515028\(2001\)020<1276:DAEOAS>2.0.CO;2](http://dx.doi.org/10.1897/15515028(2001)020<1276:DAEOAS>2.0.CO;2)
22. JD Woodling, EM Lopez, TA Maldonado, DO Norris, and AM Vajda. Intersex and other reproductive disruption of fish in wastewater effluent dominated Colorado streams, *Comp. Biochem. Physiol. C Toxicol. Pharmacol* 2006; 144: 10-15.
23. KA Kidd, PJ Blanchfield, KH Mills, VP Palace, RE Evans, JM Lazorchak, et al. Collapse of a fish population after exposure to a synthetic estrogen, *Proc. Natl. Acad. Sci. USA* 2007; 104: 8897-8901. <http://dx.doi.org/10.1073/pnas.0609568104> PMID:17517636 PMCid:PMC1874224
24. F Pomati, C Orlandi, M Clerici, F Luciani, and E Zuccato. Effects and interactions in an environmentally relevant mixture of pharmaceuticals, *Toxicol. Sci* 2008; 102: 129-137. <http://dx.doi.org/10.1093/toxsci/kfm291> PMID:18048368
25. CG Daughton, and TA Ternes. Pharmaceuticals and Thai J. Pharm. Sci 2010; 34: 117-123
26. Personal care products in the environment: agents of subtle change?, *Environ. Health Perspect* 1999; 107: 907-942. <http://dx.doi.org/10.1289/ehp.99107s6907>
27. OA Jones, N Voulvoulis, and JN Lester. Human pharmaceuticals in the aquatic environment: a review, *Environ. Technol* 2001; 22: 1383-1394. <http://dx.doi.org/10.1080/09593332208618186> PMID:11873874
28. DW Kolpin, ET Furlong, M Meyer, EM Thurman, SD Zaugg, LB Barber, et al. Pharmaceuticals, hormones and other organic wastewater contaminants in U.S. streams: a national reconnaissance, *Environ. Sci. Technol* 2002; 36: 1202-1211. <http://dx.doi.org/10.1021/es011055j>
29. TA Ternes, M Stumpf, J Mueller, K Haberer, RD Wilken, and M Servos M. Behavior occurrence of estrogens in municipal sewage treatment plants-I. Investigations in Germany, Canada and Brazil, *Sci. Total Environ* 1999; 225: 81. [http://dx.doi.org/10.1016/S0048-9697\(98\)00334-9](http://dx.doi.org/10.1016/S0048-9697(98)00334-9)
30. CG Daughton. Cradle-to-cradle stewardship of drugs for minimizing their environmental disposition while promoting human health. I. Rationale for and avenues toward a green pharmacy, *Environ. Health Perspect* 2003; 111: 757-774. <http://dx.doi.org/10.1289/ehp.5947> PMID:12727606 PMCid:PMC1241487
31. GM Hawksworth, DJ Wright, and H Chrystyn. A detailed analysis of the day to day unwanted medicinal products returned to community pharmacies for disposal, *J. Soc. Admin. Pharm* 1996; 4: 215-222.
32. TM Morgan. The economic impact of wasted prescription medication in an outpatient population of older adults, *J. Fam. Pract* 2001; 50: 779-781. PMID:11674911
33. KW Garey, ML Johle, K Behrmann, and MM Neuhauser. Economic consequences of unused medications in Houston, Texas, *Ann. Pharmacother* 2004; 38: 1165-1168. <http://dx.doi.org/10.1345/aph.1D619> PMID:15138296
34. HS Abou Auda. An economic assessment of the extent of medication use and wastage among families in Saudi Arabia and Arabian Gulf countries, *Clin. Ther* 2003; 25: 1276-1292. [http://dx.doi.org/10.1016/S0149-2918\(03\)80083-8](http://dx.doi.org/10.1016/S0149-2918(03)80083-8)
35. IS Ruhoy, CG Daughton. Beyond the medicine cabinet: an analysis of where and why medications accumulate, *Environ. Int* 2008; 34: 1157-1169. <http://dx.doi.org/10.1016/j.envint.2008.05.002> PMID:18571238
36. PE Stackelberg, ET Furlong, and MT Meyer. Persistence of pharmaceutical compounds and other organic wastewater contaminants in a conventional drinking water treatment plant, *Sci. Total. Environ* 2004; 329: 99-113. <http://dx.doi.org/10.1016/j.scitotenv.2004.03.015> PMID:15262161
37. K Kummerer. Drugs in the environment: emission of drugs, diagnostic aids and disinfectants into wastewater by hospitals in relation to other sources: a review, *Chemosphere* 2001; 45: 957-969. [http://dx.doi.org/10.1016/S0045-6535\(01\)00144-8](http://dx.doi.org/10.1016/S0045-6535(01)00144-8)
38. Statistics Canada. Disposal of household special wastes. Available from: <http://www.statcan.ca/english/free/pub/16-002-XIE/2008001/10539-en.Htm> (internet); 2005.
39. EA Abahussain, E Douglas, DE Ball, and WC Matowe. Practice and opinion towards disposal of unused medication in Kuwait, *Med. Princ. Pract* 2006; 15: 352-357. <http://dx.doi.org/10.1159/000094268> PMID:16888392
40. JP Bound and N Voulvoulis. Household disposal of pharmaceuticals as a pathway for aquatic contamination in the United Kingdom, *Environ. Health Perspect* 2005; 113: 1705-1711. <http://dx.doi.org/10.1289/ehp.8315> PMID:PMC1314909
41. R Braund, BM Peake and L Shieffelbien. Disposal practices for unused medications in New Zealand, *Environ Inter* 2009; 35: 952-955. <http://dx.doi.org/10.1016/j.envint.2009.04.003> PMID:19423167
42. M Persson, E Sabelstr M and B Gunnarsson. Handling of unused prescription drugs-knowledge, behavior and attitude among Swedish people, *Environ. Inter* 2009; 35: 771-774. <http://dx.doi.org/10.1016/j.envint.2008.10.002> PMID:19013646

QUICK RESPONSE CODE 	ISSN (Online) : 2277 -4572
	Website http://www.jpsonline.com

How to cite this article:

Gupta Dharmender, Gupta Ashutosh, Ansari N. A, Ahmed Q.S. Patient's opinion and practice toward unused medication disposal: A qualitative study. *J Pharm Sci Innov.* 2013; 2(5): 47-50.