



A questionnaire - based study of the disposal of unused and expired medications among the general public in North Karnataka

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ABSTRACT

This study was conducted to assess the disposal practices of unused and expired pharmaceuticals at the urban areas of North Karnataka. A prospective questionnaire study for six months were conducted. People above the age of 18 years were included in the study. Data from the questionnaire was analyzed using appropriate statistical tools. A total of 306 participants were enrolled in the study. The study revealed that out of these 306 respondents, 55.2% were males and 44.8% were females. Most of the participants 65.6% were aged between 20 - 29 years. Most of the participants were educated. 91% participants opined that they purchased medicines on prescription. 91% checked the expiry date of medicines, prior to purchase. 65% participants felt that their methods of drug disposal were safe. 81% participants agreed that there was a need for safe drug disposal guidelines for public. 51% participants were throwing the expired medicines in household garbage, 30% kept the medicines at home until expired, 2% flush unused medications in toilet or sink, 8% had return the unused medicines to medical stores, 6% gave to friends or relatives and 3% had donated to hospital. Safe disposal of pharmaceuticals after its use or expiry is very much important, otherwise it will create a wide range of toxicity in environment. The knowledge of general public about disposal of unused and expired medicines and problems associated with it was good. Attitude was also very empathetic, but this is not transforming into practices.

INTRODUCTION

Medicines that have expired or are no longer in use are potentially dangerous substances that must be properly managed in order to avoid the accumulation of highly harmful pharmaceuticals in the environment. When pharmaceutical wastes are incorrectly disposed of, contamination and a wide range of toxicities in humans and animals can result. By drinking contaminated water, people can be exposed to or collect traces or residues of medications from the environment.^[1]

If unused or expired medicines are not properly disposed of, they can constitute a threat to public safety and the environment, as many drugs have two lives: one in the body of animals/humans and another in the environment. Cocaine, oral contraceptives, carbamazepine, and iodine contrast media are only a few of the substances that have been discovered in traces in the environment,

usually in water. The environment then has an impact on humans and animals as a result of these medications. Similarly, the species of vultures in India has dropped to the point where it has been labelled an endangered species. As a result, the Indian government restricted the use of diclofenac in veterinary medicine.^[3]

Self-medication is more common in India (about 53.57 percent), with NSAIDs and anti-allergic medicines being the most commonly used medications for headache and cold. Furthermore, in a country like India, where there is no legal definition for over-the-counter pharmaceuticals, the control over drugs that can be purchased by the general public is quite limited. Antibiotics can also be purchased without a prescription.^[7]

This is a global hazard that has spawned a new school of science known as Ecopharmacovigilance (EPV). EPV is concerned with the detection, assessment, understanding, and

avoidance of adverse effects caused by pharmaceuticals in the environment, which affect humans and other animals.^[2]

There are a few public awareness efforts about proper medicine waste disposal methods and procedures as well. As a result, policymakers in this sector need to know about patients' knowledge, attitudes, and habits about the disposal of unwanted and expired household/leftover pharmaceuticals. Understanding the degrees of KAP will make the process of raising awareness.

MATERIALS AND METHODS

A prospective questionnaire-based study was conducted for a period of 6 months from 1st January 2021 to 30th June 2021 in the urban areas of Raichur district in North Karnataka. People above the age of 18 years and participants who are willing to participate were included in the study. The sample size calculated for the study was 306. Participants who were not willing to participate in the study were excluded from the study. A four-part questionnaire form was specially designed and validated. Participants consent form was taken. It was a self-administered questionnaire. Participants were asked to put a tick mark on appropriate answer. The completed questionnaire was taken back and data were analyzed using descriptive statistics like frequency distribution and percentage. The study was approved by Committee by issuing ethical clearance certificate.

Collection of Data

A total of 306 collected questionnaires were analysed for accurate data. The filled questionnaires were analysed and monitored for the variables like age, gender, level of education, knowledge towards ways of procuring medicines, attitude towards disposal of unused and expired medicines and practice

towards disposal of unused and expired medicines. Project team distributed questionnaire to the study participants. Project team approached eligible study participants and discussed about purpose of the study. Participants consent form was taken. It was a self-administered questionnaire. Participants were asked to put a tick mark on appropriate answer. The completed questionnaire was taken back and data were analyzed using descriptive statistics like frequency distribution and percentage. Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS

A total of 306 participants among general population residing in urban areas of Raichur district were randomly selected and followed for the present study. The cases were analyzed based on the following parameters.

Demographic status of participants

Out of the 306 respondents, 169 (55.2%) were males and 137 (44.8%) were females. Most of the respondents 201 (65.6%) were aged between 20 - 29 years. Most of the respondents were educated; 15 (5%) of respondents had up to secondary education, 288 (94%) were university graduates and 2 (1%) was illiterate as shown in Table 1.

Ways of procuring medicines

Regarding knowledge about ways of procuring medicines 277 (91%) respondents opined that they purchased medicines on prescription, which showed rational medicine purchase practices. Almost 22 (7%) respondents purchased medicines over the counter for self-medication and this indicates that respondent education status correlated with level of awareness of the

Table 1 : Demographic characteristics of respondents (N=306)

Parameter		No. of Respondents
Gender	Male	169
	Female	137
Age	20-29	201
	30-39	53
	41-49	23
	50-59	28
	Above 60	1
Level of education	University	288
	Secondary	15
	Primary	1
	Illiterate	2

Table 2 : Ways of procuring medicines (N=306)

Ways of procuring medicines	No. of Respondents
Purchased on prescription	277
Purchased over the counter	22
Purchased based upon the advice of a relative or relative	6
Received from friend or colleague	1

Table 3 : Knowledge towards disposal of unused and expired pharmaceuticals (N=306)

Parameter		No. of Respondents
Checking expiry date of the medicine before procuring	Yes	277
	No	29
Drugs Can Cause Environmental Pollution	Yes	241
	No	65
The expired/unused medicines which are not properly disposed, pose hazards to public safety	Yes	287
	No	19

potential health risks associated with OTC purchase of medicines which has been shown to be taking of excessive drug dosage, continuous medicine use, polypharmacy and drug interactions^[9]. Almost 6 (2%) purchased medicines based upon the advice of friends as shown in table 2.

Knowledge towards disposal of unused and expired pharmaceuticals

Table 3 showed that, out of 306 respondents, 277 (91%)

checked the expiry date of medicines, prior to purchase and 29 (9%) did not checked expiry date of the medicine before procuring. Knowledge regarding drugs that consume can cause environmental (water and soil) pollution. Out of 306 respondents, 241 (91%) felt that the drugs they consume could cause environmental pollution. Out of 306 respondents, 287 (94%) said that expired/unused medicines which are not properly disposed, pose hazards to public safety.

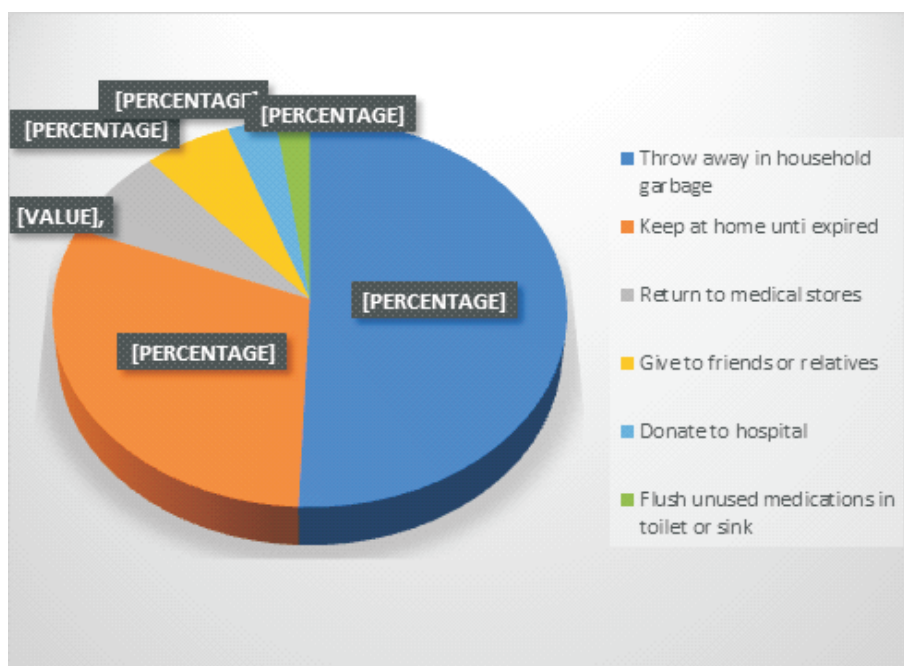
Table 4 : Attitude towards disposal of unused and expired pharmaceuticals (N=306)

Parameter		No. of Respondents
Opinion about the present methods safe for disposing medicines	Yes	200
	No	106
Opinion about having guidelines for public for ecologically safe disposal of medicines	Yes	291
	No	15
Opinion about having safe medicine disposal locations (e.g. collection boxes for unused drug in hospitals, pharmacies in city)	Yes	283
	No	23
Opinion about manufactures and pharmacies having drug take back schemes	Yes	272
	No	34

Attitude towards disposal of unused and expired pharmaceuticals

Regarding attitude towards whether the present methods are safe for disposing medicines 200 (65%) out of 306 respondents felt that their methods of drug disposal were safe and 106 (35%)

having the opinion that current disposal methods are not safe. 291 (81%) respondents agreed that there was a need for safe drug disposal guidelines for public. 283 (92%) accepted that there should be drug collection locations. 272 (89%) agreed the need of drug take back schemes and 34 (11%) were not agreed as illustrated in Table 4.

**Fig 1 :** Good practices with the unused medicines (N=306)

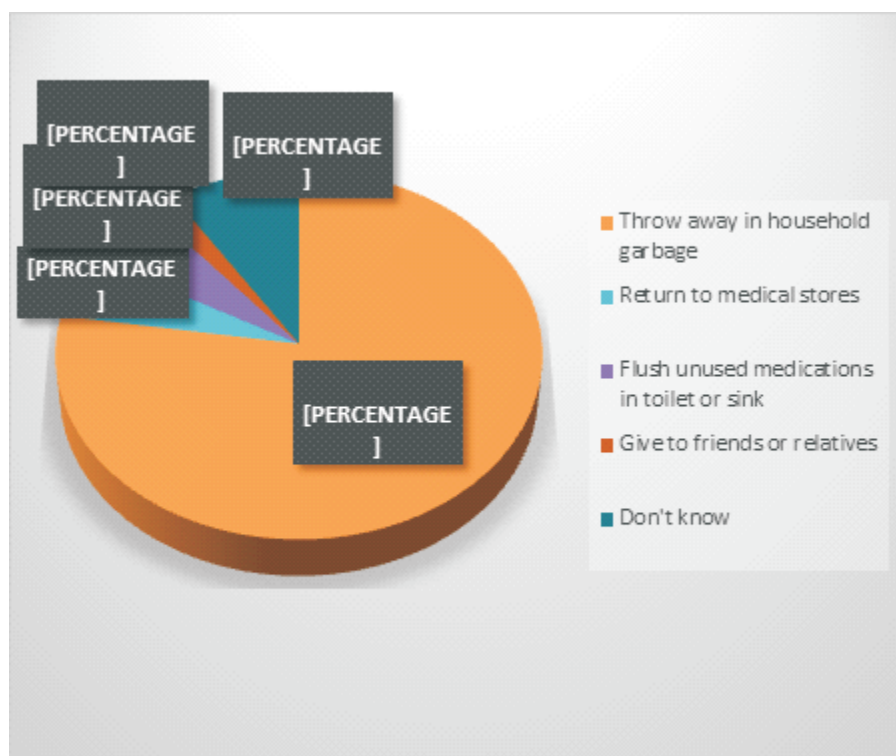


Fig 2 : Good practices with the expired medicines (N=306)

Practice towards disposal of unused and expired pharmaceuticals

Figure 1 showed that, out of 306 respondents 155 (51%) were throwing the expired medicines in household garbage, 93 (30%) kept the medicines at home until expired, 7 (2%) flush unused medications in toilet or sink, 23 (8%) had return the unused medicines to medical stores, 18 (6%) gave to friends or relatives and 10 (3%) had donated to hospital.

Figure 2 showed that out of 306 respondents 237 (77%) had thrown away in household garbage while 18 (6%) flushed unused medications in toilet or sink, 17 (6%) had returned to medical stores and about 6 (2%) had only given to friends or relatives and 28 (9%) expressed they are confused with disposal of expired medicines.

DISCUSSION

If unused or expired medicines are not properly disposed of, they can constitute a threat to public safety and the environment, as many drugs have two lives: one in the body of animals/humans and another in the environment. Medication disposal that is careful and proper can help to reduce drug pollution in the environment. To maintain health and environmental safety, a proper waste management system is required.^[3] The knowledge, attitude, and practice of disposing of unwanted and expired pharmaceuticals could help to reduce drug pollution in the environment.

Past studies has shown that even low levels of pharmaceuticals in the environment can impact animal and plant life, resulting in renal failure in vultures, impaired reproduction in fish, and growth inhibition in certain aquatic species. One possible solution to this problem is to raise knowledge about the dangers of incorrect drug disposal and to encourage more

environmentally conscious behaviour.

It was found that keeping drugs at home was a common practise in this study. The most common causes of medicine accumulation were non-adherence to treatment, which resulted in prescription expiration, and over-the-counter drug purchases for self-medication. The first step in addressing the problem of unwanted drug disposal is to educate individuals about how to reduce pharmaceutical waste generation. The most common dosage forms found at home in this investigation were topical medications.^[5]

The educational level of the participants played a significant effect in the purchase of medicines, with 85.6 percent of university graduates purchasing drugs on prescription and only purchasing over the counter for self-medication. In our survey, nearly all respondents verified the expiry date of medicine before purchasing it, however in the Indian state of Gujarat, many people were unaware of the expiry date. It is critical to verify the expiry date of any medicine before purchasing or using it, as failure to do so could result in dangerous side effects.^[10]

Participants in the current study were cautious about disposing of excess drugs at home, however many were ignorant of safe disposal alternatives. The World Health Organization (WHO) has instructions for "safe disposal of unused medications." In addition, the National Formulary of India provides an appendix 7 that details how to dispose of unneeded or expired pharmaceuticals. GMPs, which are outlined in Schedule M of the 'Pharmaceuticals and Cosmetics Rules, 1945,' also include rules for the disposal of waste, including rejected drugs. Wholesale chemists, clinics, hospitals, and pharmaceutical producers will benefit from these recommendations, while average customers will not. These findings were corroborated in our survey, with 81 percent of participants agreeing that standards

for environmentally safe drug disposal by people are needed.^[3]

According to the data, the majority of participants said they discard expired drugs in the garbage, which is consistent with earlier studies. All of these ways to proper disposal of unused medications are important in reducing pharmaceutical introduction into the environment, which can pose environmental, human health, and safety risks.

It is critical to raise awareness about how to dispose of unwanted and expired drugs in order to conserve the environment, as a lack of understanding and practise can lead to a variety of issues such as pollution and health risks, either directly or indirectly. Raising public awareness may also encourage people to engage in healthy behaviours and participate in health-promoting activities. Two essential characteristics that increase preventative health practices are increasing motivation and increasing confidence. Our findings will be useful for policymakers to develop a nationwide medicine disposal system.

A follow-up study could be undertaken to see if study participants awareness levels have improved. It is necessary to establish frequent continuing medical education programmes on the disposal of expired and unused drugs at the institutional level. It is envisaged that the findings of our investigation would lead to other prospective pharmacoepidemiological studies that will validate the findings. This study was conducted on a small sample of people from the Raichur district's urban districts. Future research in diverse groups with varying literacy and socioeconomic backgrounds is possible.

CONCLUSION

The study had presented the knowledge, attitude and practice of disposal of unused and expired pharmaceuticals among general public in north Karnataka region. From the questionnaire it was observed that the knowledge of general public about disposal of unused and expired medicines and problems associated with it was good. Attitude was also very empathetic, but this was not transforming into practices. Gaps exist in knowledge and practices, therefore robust, safe and cost-effective pharmaceutical waste management program supported with media campaign is needed. Healthcare practitioners and community pharmacists should be trained and then offer training to educate customers on standard medicine disposal practices.

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