

# A Survey of Knowledge, Attitude, and Practice of Consumers at a Tertiary Care Hospital Regarding the Disposal of Unused Medicines

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## ABSTRACT

**Objectives:** To evaluate the knowledge, attitude and practice of consumers in India about disposal of unused medicines. **Materials and Methods:** A questionnaire comprising 11 questions evaluating the Knowledge (2), Attitude (3) and Practice (6) of unused medicines was prepared and pre validated before administering to 200 consumers of medicines attending the outpatient department of Civil Hospital Ahmedabad, a tertiary care teaching hospital in Western India. Requisite permissions from Institutional Ethics Committee and informed consent were obtained prior to recruiting them for the study. Responses were recorded, in Microsoft Excel® spreadsheet and evaluated for percentage response. **Results:** Majority of the respondents (136, 68%) stored unused medicines at home. Analgesics (26.5%) were the most common unused medicine stored. Safe disposal of medicine was considered necessary by majority respondents (160, 80%) for different reasons like prevention of illegal/unintended use (84, 42%), prevention of environmental pollution (32, 16%) or possible ADR caused by old drugs (54, 27%). Only 78 (39%) respondents were aware of appropriate methods of disposal. Disposal in household trash (61, 30.5%) was the most common method used. Majority of respondents felt the need for a facility

or programme to collect unused medicines (152, 76%) and an increased awareness among consumers regarding hazards and methods of disposal of unused medicines (154, 77%). **Conclusion:** Majority of consumers are aware about the need for safe disposal of unused medicines. But the right attitude for and practice of safe disposal of medicines is lacking. A need for increased awareness regarding safe disposal of medicines is acknowledged by majority of consumers.

**Key words:** Attitude and practice, knowledge, medicine disposal, unused medicines

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## INTRODUCTION

Use of drugs for humans and veterinary practices is increasing daily, and most consumers are left with some unused medicines at one time or the other. A study in Ethiopia revealed that 89.1% of medicines purchased by consumers are never used.<sup>[1]</sup> Factors such as change of prescription by prescribers, adverse effects of the drug, unclear instruction, resolution of condition/clinical symptoms, and medicines reaching the expiry date contribute to nonusage and disposal of medicines by consumers.<sup>[1,2]</sup>

Improper disposal of medicines is associated with environmental pollution and health hazards.<sup>[3]</sup> Ecopharmacovigilance is an important area in this context. It is defined as “the science and activities associated with the detection, evaluation, understanding, and prevention of adverse effects of pharmaceuticals in the environment.”<sup>[4]</sup> Human pharmaceuticals have been detected increasingly in environment in the recent years in surface water. Adverse effects of these pharmaceuticals in other species are well documented. Some years ago, unintended exposure to diclofenac was reported to affect vultures, adversely producing a substantial decline in their numbers.<sup>[5]</sup> A study from Sweden suggested that early progesterone exposure leads to sterility in frogs.<sup>[6]</sup> Bound and Voulvoulis from the United Kingdom have reiterated that entry of pharmaceuticals into environment through disposal in trash and sink/toilet requires a great attention.<sup>[7]</sup> Apart from the environmental and ecological effects, stocking expired or unused medicines or donating these to others can lead to accidental or inappropriate ingestion, increasing the risk of adverse effects.

A recent review suggests that consumers use different methods for disposing unused medicines, most commonly throwing medicines in

garbage, toilet, or sink.<sup>[8]</sup> In a study conducted by Swaroop *et al.* in India, most consumers stated that they dispose medicines in garbage and sink.<sup>[9]</sup> In a study conducted by Seehusen and Edwards<sup>[10]</sup> in the United States, more than half of the patients surveyed reported storing unused and expired medications at their homes, and more than half had flushed these down a toilet. Despite being a large consumer of medicines, regulatory guidelines for safe disposal of medicines for consumers are lacking in India, and drug take-back programs are not functional/effective as in other countries. A study conducted by Glassmeyer *et al.* in the United States suggested that providing the consumer with additional options for disposal by various community, city, and state collection events, ongoing programs such as opportunity to mail or bring unused medications to various collection points, such as pharmacies, may lead to their safe disposal.<sup>[11]</sup> Although the National Formulary of India, 2011, specifies guidelines for disposal of medicines,<sup>[12]</sup> most people are not aware of and/or do not follow these guidelines. It is, thus, important to assess knowledge and practices employed by consumers in India with regard to medicine disposal. Keeping in view these facts, this study was carried

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out to evaluate the knowledge, attitude, and practices of consumers regarding the disposal of unused medicines.

## MATERIALS AND METHODS

This was a cross-sectional, questionnaire-based study, conducted at the outpatient department (OPD) of a tertiary care teaching hospital in Gujarat for 3 months. The study was approved by the Institutional Ethics Committee (Approval No. IEC/certi/155/14). An interviewer-administered questionnaire consisting of 11 questions including two to assess knowledge, three to assess attitude, and six to assess practices of consumers regarding the disposal of unused medicines was prepared and prevalidated. The modified questionnaire was administered to a total of 200 consumers attending medicine, obstetrics and gynecology and surgery OPDs after obtaining written informed consent. Consumers not willing to participate in the study or did not provide written informed consent were excluded from the study. Sampling was done on a convenient basis. Responses of participants were recorded and entered in Microsoft Excel 2007. Data were analyzed for frequency and percentage responses.

## RESULTS

A total of 200 consumers attending medicine, surgery, obstetrics, and gynecology OPDs were enrolled. Out of the 200 consumers, 155 (77.5%) were men and 45 (22.5%) were women. Mean age of the participants was  $32 \pm 6.2$  years. Consumers belonged to varied background and middle-to-lower socioeconomic strata of the society. Sources of medicines for consumers included pharmacy stores with (121, 60.5%) or without (40, 20%) doctor's prescription, and unused medicine at home (25, 12.5%) or friends and relatives (14, 7%).

### Evaluation of knowledge

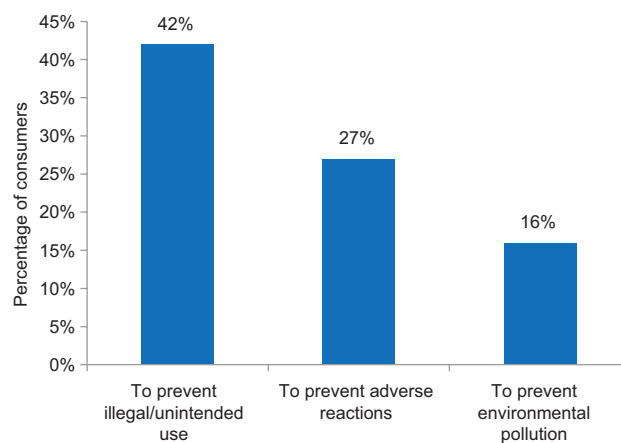
A total of 78 (39%) participants responded that they were aware of methods and sites of disposal of medicines. The method of disposal considered as best by participants included throwing in household trash (34, 17%), flushing in toilet (20, 10%), throwing in river or lake (4, 2%), returning to pharmacist (16, 8%) or prescriber (2, 1%), and donating the medicines to hospitals or voluntary organizations (2, 1%). Seven (3.5%) participants were aware of institution or organizations which collect unused medicines. Institutions suggested by these participants included pharmacy stores (3, 1.5%), municipality hospitals (2, 1%), neighboring health centers, and public health centers (2, 1%).

### Evaluation of attitude

A total of 160 (80%) participants opined that safe disposal of medicines is necessary. Reasons for considering the safe disposal as necessary are illustrated in Figure 1. Majority (152, 76%) of the consumers felt the need for a program to collect unused medicines from home. In addition, majority (154, 77%) of the participants opined that consumers should be made more aware about the hazards of unsafe disposal and methods of safe disposal. Measures suggested by participants to improve consumers' awareness included patient education by pharmacists, doctors, or nurses (57, 28.5%), provision of information in newspapers (39, 19.5%), television (32, 16%), or posters (18, 9%), awareness programs by the government (3, 1.5%), education by village health workers (3, 1.5%), and written instructions on medicines (2, 1%).

### Evaluation of practice

A total of 136 (68%) consumers had unused medicines at home. The reasons for stocking unused medicines included frequent change of prescription by doctors (40, 20%), prescription of more number of drugs than required (20, 10%), purchase of more medicines by consumers for



**Figure 1:** "Why is safe disposal of medicines necessary?" - Responses of consumers ( $n = 160$ )

possible future use (15, 7.5%), stoppage of treatment on symptomatic relief (58, 29%), and noncompliance to therapy (3, 1.5%). Most common medicines stored by consumers included analgesics (53, 26.5%), vitamins (35, 17.5%), topical antimicrobials (25, 12.5%), and oral antimicrobials (17, 8.5%). Other medicines stored by consumers included antacids (4, 2%), antipyretic drugs (6, 3%), and cough syrup (4, 2%). Analgesics (61, 30.5%) and vitamins (35, 17.5%) were the most common medicines disposed off by participants followed by oral (22, 11%) and topical antimicrobials (21, 10.5%) [Figure 2]. Throwing in household trash was the method most commonly employed to dispose medicines, followed by flushing in sewer (24, 12%), returning to seller or pharmaceutical company (16, 8%), flushing in river (14, 7.5%), and burning at home (4, 2%). Other methods used by consumers to dispose medicines were returning to hospitals (4, 2%) and donating to poor (3, 1.5%) [Figure 3]. A total of 22 (11%) participants had difficulties in disposing medicines. Advice regarding disposal of medicines was sought by 28 (14%) participants from pharmacists (9, 4.5%), friends (8, 4%), doctors (5, 2.5%), family members (3, 1.5%), and nurses (3, 1.5%). Various advices given were to dispose unused medicines in trash, flush in sink (wash basin), flush in toilet, return to pharmacy, store for future use, and throw in river. Majority of the consumers (22, 11%) were satisfied with the advice [Table 1].

## DISCUSSION

The current study was an observational, cross-sectional, questionnaire-based study conducted in 200 consumers of medicines attending the OPD of a tertiary care hospital in Gujarat. The knowledge, attitude, and practice of consumers regarding the disposal of unused medicines were evaluated using a prevalidated investigator-administered questionnaire.

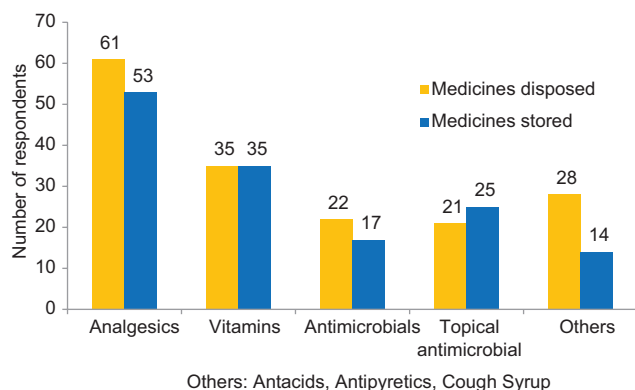
In the present study, majority (77.5%) of the participants were men, and the mean age of participants was  $32 \pm 6.2$  years. This may be ascribed to the fact that participants were enrolled from OPDs of three departments, i.e., medicine, surgery, obstetrics, and gynecology. Young women attended OPD of obstetrics and gynecology in larger numbers, contributing to relatively young cohort. Sampling, however, was done on a convenient basis, and its influence on these characteristics cannot be ruled out. Furthermore, the younger male patients were more forthcoming in their providing consent to participate in the study.

In the present study, majority (60.5%) of the participants responded that they acquire medicines from pharmacy stores with the doctor's prescription. However, a significant number of consumers had also bought medicines from pharmacy without doctor's prescription (20%)

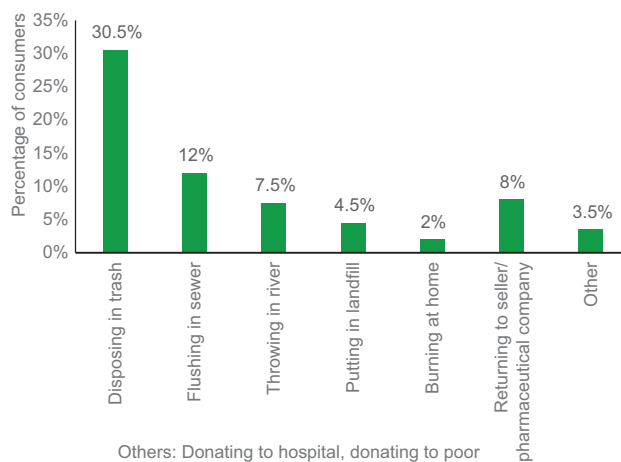
**Table 1:** Advice sought by consumers\* (*n*=28) regarding the methods of safe disposal of medicines

Sought advice from	Dispose in trash	Flush in sink/toilet	Return to pharmacy	Store for future use	Donate to poor	Throw in river	Total, <i>n</i> (%)
Doctors	3	2					5 (2.5)
Pharmacist	2	1	4	1	1		9 (4.5)
Friends	1	1	2		3	1	8 (4)
Family members	1			2			3 (1.5)
Nurses	1	2					3 (1.5)

\*Only 28 out of 200 consumers sought advice regarding the methods of medicine disposal



**Figure 2:** Medicines commonly stored and disposed by consumers



**Figure 3:** Various means of disposal of medicines by consumers

or from friends and relatives (7%). Remaining participants agreed to having used previously stored medicines instead of buying new ones. Abahussain *et al.* had reported that 16% of the consumers acquire medicines from pharmacy without doctor's prescription.<sup>[13]</sup> Unsupervised use of medicines associated with an inherent risk of adverse effects can be harmful to consumers. Further, it may lead to therapeutic failure and should be discouraged.

In the current study, majority (68%) of the participants stated that they store unused medicines at home. Similar findings were reported by studies conducted in Ireland, New Zealand, and Nigeria.<sup>[14-16]</sup> Major reasons suggested by participants in the present study for this practice included stoppage of therapy on symptomatic cure, frequent change of prescription by doctors, and prescription of more medicines than required. Self-stoppage of treatment by consumers on achieving symptomatic cure has also been reported by Braund *et al.* in New Zealand<sup>[15]</sup> and Lagishetty *et al.* in South India.<sup>[17]</sup> In a study conducted in the United States by Law *et al.*, approximately, two of three prescription medications were unused. Disease/condition improved (42.4%), forgetfulness (5.8%), and side effects (6.5%) were reasons cited for their nonuse.<sup>[18]</sup> Not just does this practice lead to unnecessary stocking of medicines, but also indicates a lack of awareness among consumers regarding the importance of completion of therapy. Patient education in this regard, primarily by prescribers and pharmacist, is recommended. The findings of the present study also suggest that doctors should choose medicines judiciously during the first prescription itself, and minimize or avoid frequent changes in prescriptions to counter the problem of stocking of medicines by consumers. They should also counsel the patients regarding disposing or avoiding reuse of unused medicines or seek advice if the patient wishes to reuse these medications. Some consumers bought more medicines for future use, which should be addressed by patient counseling.

Majority of the participants (61%) in this study were not aware about the methods and sites of medicine disposal, implying a very poor awareness. Of the remaining participants, majority perceived disposal in

household trash (17%) and flushing in toilet (10%) as the best methods of disposal. Only 8% of the participants in the current study perceived returning unused medicines to pharmacy as the best method of drug disposal. In addition, few (3.5%) consumers were aware of organizations or institutions such as pharmacy, hospitals, or health centers that collect unused medicines, implying a poor level of knowledge. In similar studies conducted in Malaysia<sup>[19]</sup> and Kuwait,<sup>[13]</sup> majority of the respondents (32.1% and 54%, respectively) stated that returning medicines to pharmacy was the best method of disposal of medicines. Raising awareness through various educational interventions should be considered to improve the disposal practice.

Most participants (80%) in the present study comprehended the importance of safe disposal and hazards associated with unsafe disposal of medicines such as illegal/unintended use of medicines, adverse reactions, and environmental pollution. Most participants also felt the need of increased awareness among consumers regarding these issues.

The consumers sought education by pharmacist, nurses, and doctors, which could hint toward faith of consumers in these health professionals. Similar recommendations were put forth by respondents in a study conducted by Lagishetty *et al.* in South India.<sup>[17]</sup> Information about safe disposal of medicine in newspapers and television are yet another means of improving the awareness. The channels of information are commonly used for cleanliness and health campaign. A novel suggestion that emerged from the study was the establishment of a program/facility to collect unused medicines from homes. Respondents in a study conducted in Malaysia also suggested similar means.<sup>[20]</sup> This study was conducted among parents of school-going children to evaluate the knowledge, attitude, and practice of unused medicine disposal. Pharmacy (9.6%), physicians (15.1%), newspapers (35.2%), and media (40.1%) were suggested as a source of information in this study.

Most medicines stored by consumers were those that were required for common ailments such as pain, fever, cough, epigastric distress, and “generalized weakness.” While this practice may not be entirely irrational, it is important for the consumers to be aware of safe use and disposal of unused medicines and optimize storage requirements for these medicines. Pain relievers, vitamins, and topical and systemic antimicrobials (both prescription and over-the-counter) were the most often stored medicines as stated by consumers in the present study. Common use of analgesics in pain, a common symptom, may explain this observation. Interestingly, stocking of topical and systemic antimicrobials implied that many of these medicines were stopped prematurely by consumers or stored for future use. Such unsupervised medicine use, however, can increase the chance of drug resistance and should be discouraged.

A substantial number of participants in the present study disposed medicines in household trash. Disposal in household trash by consumers was also been reported by Lagishetty *et al.*,<sup>[17]</sup> Gupta *et al.*,<sup>[21]</sup> and Law *et al.*,<sup>[18]</sup> perhaps owing to the fact that it is easy and least time-consuming practice. However, the method increases the risk of misuse and/or accidental exposure to drugs. Storage of medicines for future use or lending these to friends or relatives (recycling) was also stated by some consumers. However, such practice can lead to unsupervised drug use and should be discouraged. Most consumers did not seek any advice regarding drug disposal, which implies that these practices were perceived as adequate or correct by the consumers. The minority of the participants who sought advice consulted pharmacists, doctors, friends, or family members and nurses. Methods recommended by these personnel, such as disposal in household trash, flush in sink (wash basin) or toilet, are however not ideal and implied a lack of awareness even among health professionals. Similar observations were reported by Abahussain *et al.*<sup>[22]</sup> and Swaroop *et al.*<sup>[9]</sup> In the study conducted by Swaroop *et al.* in South India among medical professionals, 77% stated that pharmaceutical companies should take back the expired drugs. However, 65% of the respondents agreed that they dispose unused medication in the garbage and 9% of the respondents dispose in the toilet or sink (wash basin). In a study conducted among pharmacists by Abahussain *et al.*, the respondents stated that they disposed medicines in trash (73%), sink (32%) and toilet (9%), and/or passed it to someone (20%). A study conducted by Tai *et al.*<sup>[23]</sup> in California among pharmacists showed favorable attitude toward providing education regarding disposal of medicines. However, their knowledge in this area may be lacking and they are not consistently providing this information to their patients. This problem needs to be tackled, since consumers are likely to seek advice regarding the disposal of medicines from pharmacists.

## CONCLUSION

Consumers perceive that safe disposal of medicines is necessary. However, the requisite knowledge and practice of safe methods of disposal are currently inadequate. Educational interventions to improve awareness and regulatory interventions in this regard are recommended.

## Limitations

This study has been carried out in a small sample comprising a segment of population visiting a public health facility. There is a scope for future studies in varied samples with different literacy and socioeconomic background.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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