

Assessment of Knowledge and Practice Regarding Disposal of Unused and Expired Drugs in Medical Professionals in a Tertiary Care Teaching Hospital in Eastern India: A Cross- Sectional, Questionnaire-based Study

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Abstract

Background: Despite the effect of drugs on human body getting wide attention worldwide the effect of disposed drugs on the environment is largely neglected. Since the doctors working in a teaching hospital are the major stakeholder in ensuring proper and safe disposal of drugs their knowledge, attitude and practice regarding drug disposal was assessed in this study.

Methods: A pre-validated questionnaire was given to the doctors working in a tertiary care teaching hospital through Google form from 1st June, 2023 to 31st July 2023. Their responses were recorded in a Microsoft excel form and analyzed.

Results: It was observed that while buying medicines 87.5% of physicians check the date of expiry but only 78.9% do that while receiving physician's sample from the medical representatives. Among the participants in this study 97.2% declared that medicines remain unused in their homes. In case of unused drugs, 45.8% donate them to patients or hospitals, and 29.2% throw them away with household garbage whereas in case of expired medicines majority (56.9%) throw them away. Among the participants 38.9% had never instructed their patients about the proper disposal methods.

Conclusion: To ensure proper drug disposal programs should be initiated to increase awareness about the danger of improper drug disposal not only in general population but in medical community also.

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Keywords: Expired Drugs; Medical Professionals; Ecopharmacovigilance

Introduction

One aspect of the progress of human race is the increased complexity of the waste product it generates and the mounting difficulty and sophistication needed to dispose them. From left-over food and excreta of cave dwellers to nuclear radioactive waste, human civilization has come a long way. One of the waste products generated by modern human civilization is pharmaceutical waste. According to the World Health Organization, pharmaceutical waste is defined as “ expired, unused, spilt, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and need to be disposed of appropriately. The category also includes discarded items

used in the handling of pharmaceuticals, such as bottles or boxes with residues, gloves, masks, connecting tubing, and drug vials”(1).

So far, the medical fraternity had been concerned only about the adverse effects of medications in the human body, which has given birth to ‘Pharmacovigilance’. But the adverse effects of medications on the environment have been largely neglected. This has resulted in catastrophic effects. For example, diclofenac, a non-steroidal anti-inflammatory drug, used for treating joint pain in livestock, led to renal failure in vultures consuming the carcasses of those animals causing the gradual decline in the number of vultures in the Indian subcontinent (2). If drugs are flushed

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through drain those may get mixed with and contaminate the surface water. It has been a matter of concern in recent years as these compounds have the potential to affect both wildlife and humans. For example the continuous exposure to 17-ethinyl estradiol found in contraceptive pills can lead to the feminization of male rats (3). Thus, there is an urgent need to address this alarming issue of environmental pollution by drugs. This has led to the birth of a new field- Ecopharmacovigilance. Ecopharmacovigilance is defined as the “science and activities associated with the detection, evaluation and prevention of the adverse effects of pharmaceuticals in the environment.” (4).

A major source of pharmaceutical waste in the environment is unused or expired drugs and personal care products disposed off from households. The main reasons for medication waste generated in the households are excessive anticipatory buying, buying without checking expiry date and frequent change in the prescription by the physician, especially in case of antibiotics, self discontinuation of treatment on alleviation of symptoms (5). One of the main reasons of excessive medication waste in clinics is due to accepting medicines from medical representatives as physicians' samples without checking the expiry date, often resulting in accepting already expired medications. These unused and expired medications if not properly disposed, causes immense harm to the environment. According to the World Health Organization (WHO), the majority of medication is inappropriately prescribed and sold, which leads to unnecessary storage and creates environmental threat during improper disposal (6).

There is lack of knowledge among the general public about proper practices of disposal of unused and expired medicines (7). Although, the National Formulary of India, 2011, has specified guidelines for disposal of medicines, (8) most people are not aware of and/or do not follow these guidelines (9). It is the responsibility of health care professionals to impart this knowledge to the general public. This can only be possible if the health care professionals themselves are aware of the proper medication waste disposal methods. Thus, this study has been carried out to evaluate the knowledge and practices of health care professionals working in a tertiary care teaching hospital in eastern India, regarding the disposal of unused and expired medicines.

Methods

The study was a cross-sectional, questionnaire-based study, conducted in a tertiary care teaching hospital in eastern India. The study participants were the doctors practicing in various capacities in the hospital. After

obtaining the Institutional Ethics Committee approval, the study was conducted from 1st June, 2023 till 31st July 2023. The importance of the study was explained to the faculties. After gaining their consent, a self-administered pre-validated questionnaire was given to them via Google Forms and their responses were collected back. The questionnaire contained 15 multiple choice close ended questions. First nine questions were related to their attitude and practice regarding drug disposal and the next six questions were to assess their knowledge regarding proper drug disposal methods. Those who were not willing to participate in the study and incomplete responders were excluded from the study. Ultimately 72 completely filled up questionnaires were collected. Since the results were automatically summarized in the Google form, no other statistical software was needed.

Results

It was observed that while buying medicines 87.5% of physicians check the date of expiry but that number falls to 78.9 % while receiving physician's sample from the medical representatives. Among the physicians who participated in this study 97.2% declared that medicines remain unused in their homes among which 36.1% had that occur very commonly. As for the reason behind the medicines being remain unused, 40.3% of participants pointed to anticipatory buying of medicines and stockpiling at home while 36.1% thought that excessive supply of physician's sample by the medical representative is the cause. On the other hand, 11.1% of participants pointed to self-discontinuation of treatment on alleviation of symptoms. Regarding disposal of unused drugs, 45.8% donate them to patients or hospitals, whereas 29.2% throw them away with household garbage, 8.3% crush them and discard, 6.9% return them to pharmacies and 2.8% flush them in the toilet or sink. As for expired drugs, since the option to donate is not available, majority (56.9%) throw them away along with household garbage. 23.6% crush them and discard, 8.3% bury them in the ground, 4.2% return them to pharmacies and 2.8% flush them away. On being asked whether they have tried to receive information regarding proper drug disposal methods, only 44.4% answered in the affirmative. Among these 44.4%, majority (64.9%) said that they had sought that information from the internet, while 24.6% said that they had referred to books and 10.5% said that they had consulted their colleagues to seek that information. On enquiring whether they instruct their patients regarding proper disposal method of unused or expired drugs, only 18.1% said that they always instruct, while 38.9% said that they never instructed their patients about the

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proper disposal methods. Though majority (81.9%) of the participants said that they are aware about the Biomedical Waste Management Rule but only 27.1% could correctly answer that it was last amended in 2018 and only 32.3% had the correct knowledge that the expired drugs need

to be discarded in yellow colored containers. Among the participants, 47.6% know that 'C' needs to be marked outside the container used for discarding cytotoxic drugs and, only 56.1% know that broken glass vials or ampoules need to be discarded in blue color coded containers.

Figure 1. Mode of disposal of expired drugs.

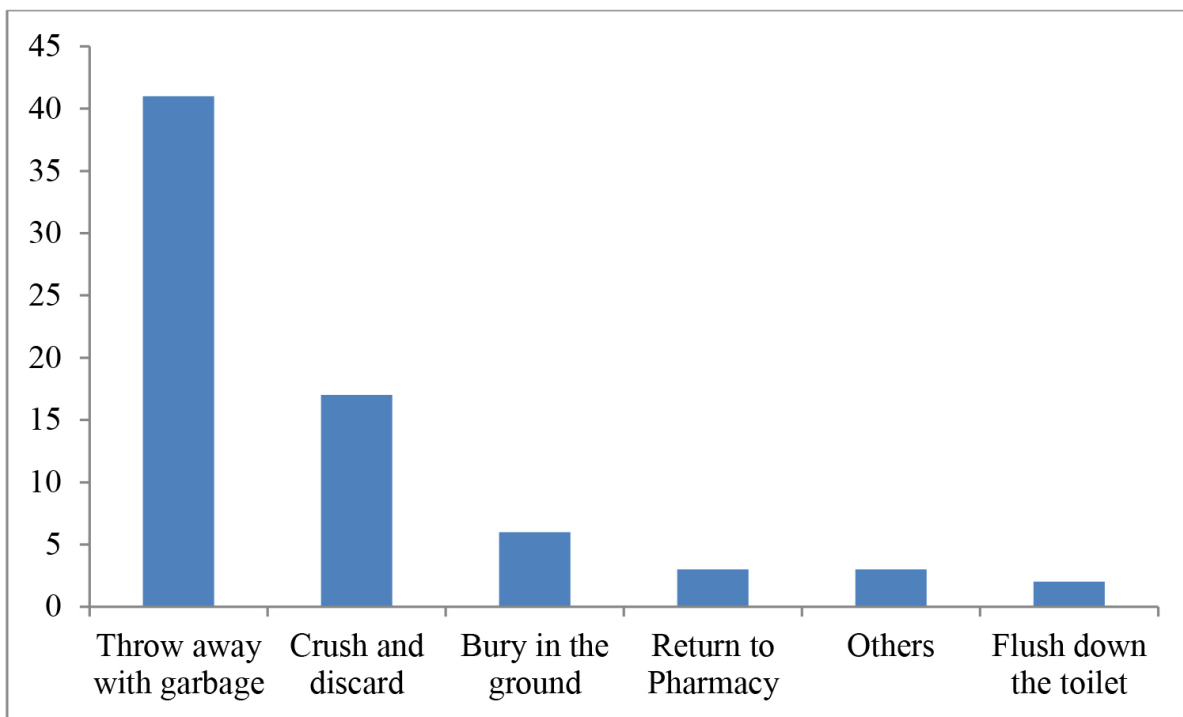
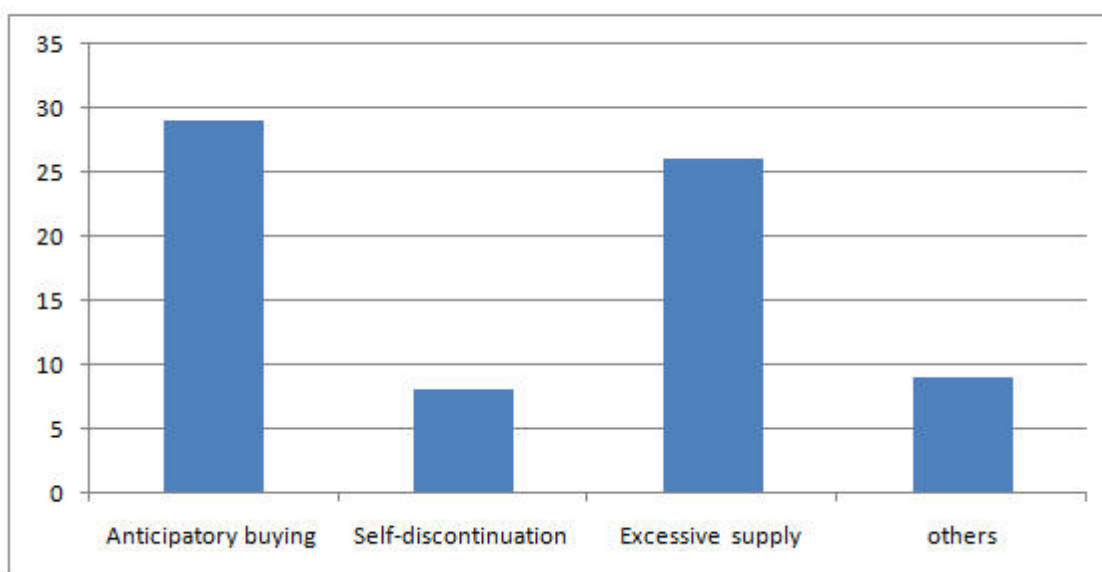


Figure 2. Reason for drugs remaining unused.



Discussion

This was an observational, cross-sectional questionnaire based study among the doctors working in a tertiary care teaching hospital in eastern India. The questionnaires were distributed through Google forms to the doctors who consented to participate in the study and total 72 questionnaires, those were completely filled were analyzed.

We found that while buying medicines from the pharmacy 87.5% of the participants check the date of expiry of the medicines but while receiving physicians' samples from the medical representatives that number comes down to 78.9%. In a similar study by Umamageswari *et al.*, (10), they have shown that 74.3% of medical professionals always check the date of expiry which is lower than what we have seen in our study. In 97.2% of the households of the physicians in our study the medicines remain unused. This is in contrast to the studies done by Shakib *et al.*, (11) who have found that 65.6% of responders have stored medicines at home. In another study by Sonowal *et al.*, they have seen that 68% of consumers have stored unused medicines. The higher percentage in context of storing medicines at home that we found in our study may be due to easier access to medicines in case of doctors. In our study the doctors feel that the major reasons for the non-utilization of medicines are anticipatory buying (40.3%) and excessive supply by the medical salesmen (36.1%) whereas the participants in a study by Sonowal *et al.*, felt that frequent change in prescription by the doctors (20%) and prescribing more number of drugs than necessary (10%) are major reasons for stocking medicines at home. It has been noted that proper method of drug disposal is largely neglected and that is a global phenomenon. We have found in our study that doctors prefer to donate the unused drugs to hospitals or patients (45.8%) and some (5%) return the drugs to pharmacies which is encouraging but a major percentage of them (49%) discard the drugs by various methods. The problem becomes more acute in case of expired drugs since those could not be donated. Among the methods adopted for disposal of drugs the commonest is throwing them along with household garbage (56.9%) followed by crushing them (23.6%) and burying them in the ground (8.3%). This finding is similar to those found by Amritha Alice *et al.*, (12) who have found that 53.1% of participants throw away the unused medicines with the trash. In another study by Sarraf *et al.*, the 68.7% of participants throw the drugs away with household garbage (13). This is a dangerous practice because these medicine can pollute the locality and may be consumed by animals or children living in streets

leading to catastrophic consequences. Another study done in Kosovo by Selvete Shuleta-Qehaja *et al.*, also found that in case of unused drugs 15.6% of responders donate them to friends or return them (11.4%) to pharmacy and the most popular method for disposal of drugs is throwing away with household trash (52.1% for unused medicines and 70.1% for expired ones respectively). (14) In our study, only 44.4% participants responded that they have tried to receive information regarding proper drug disposal methods and only 18.1% of doctors always instruct their patients regarding the proper method of drug disposal whereas 38.9% have never advised the patients regarding this issue. This finding is somewhat similar to that of a study done by Raja *et al.*, (15) who have found 26% of health care professional always instructed the patients about the methods of safe drug disposal. This is an area of concern as the text books do not instruct the medical students regarding the safe drug disposal methods and in turn the patients do not get any proper instruction. Some doctors proactively seek information regarding the drug disposal methods but the majority are yet not aware regarding this important issue. This may be more serious if the drug is of cytotoxic nature as we have found that only 47.6% of doctors in our study knew how to mark the container holding cytotoxic agents.

It is evident from this study that drug stock piling at home and improper disposal of those drugs are very common even in medical community. There is also dearth of knowledge regarding safe drug disposal methods and a reluctance to fulfill this lacuna among majority of the participants. To address this issue programs should be initiated to increase awareness about the danger of improper drug disposal not only in general population but in medical community also since they must play a pivotal role to ensure proper drug disposal. Community based campaigns to collect and dispose unused or expired medicines may be arranged. Lastly, to instill this practice from an early stage among medical fraternity safer drug disposal methods may also be included in the medical curriculum.

Conflict of interest: No potential conflict of interest was reported by the authors.

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