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KNOWLEDGE, ATTITUDE AND PRACTICES TOWARDS DISPOSAL OF UNUSED & EXPIRED MEDICATIONS AMONG RESIDENT DOCTORS IN TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Aim: To study the knowledge, attitude and practice of safe disposal of unused/expired medicines among resident doctors. **Background:** Medicines play a significant role for treating many diseases and conditions, but at the end of the treatment it is very important to dispose them of properly. The knowledge and awareness of proper drug disposal are essential for safe environment and to minimise various problems like environmental pollution and various health hazards. **Methods:** This was the questionnaire-based study conducted among the resident doctors. Sample size calculated was 110 by open Epi software. A self-structured questionnaire was validated and distributed. Collected data was analysed using Sigma Graph pad prism version-5 and Microsoft Excel 2007. **Results:** Out of 110 doctors to whom questionnaire was distributed; the response rate of 59.09% was obtained; of these 39(60%) were male & 26 (40%) female. 98% participants checked expiry dates. 68% knew the term ecopharmacovigilance. 76.56% believed that drug became toxic & lost its therapeutic effect after expiry date. Common drugs leftover were antibiotics (60.93%) & analgesics (62.5%) which were mostly in tablet form (84.38%). The major reason for having unused drugs was leftovers from previous OTC drugs (46.87%). Most practiced method of disposal was throwing in dustbin (70.13%). Majority felt that they were unaware of consequences of improper drug disposal & the best place to teach it was at pharmacy while dispensing drugs (60.93%). **Conclusion:** There are lacunae in the knowledge & practice about proper disposal of unused and expired drugs. Awareness about proper disposal of unused medicines among the resident doctors should be created.

Keywords: Ecosystem, Expiry date, Antibiotic resistance.

INTRODUCTION

It's our duty to provide effective and passionate care to patients with continual awareness. There is no doubt that mastery of medical knowledge and surgical skill is absolutely essential for practicing medicine & surgery. Yet this is insufficient to be a good doctor. Simultaneously as a doctor we must have to implement the knowledge regarding proper disposal of unused/expired drugs according to USFDA/WHO guidelines. According to this guideline unused or expired medicines should be

disposed of primarily by drug take back system. If there is unavailability of drug take back system at that location promptly next option is to immediately flush these potential dangerous medicines down the toilet. If the medicine is not from the flush list, then discard the medicine in trash [1]. Beside USFDA guideline, the WHO recommends various disposal methods such as incineration, waste encapsulation, inertization, landfill, sewer, fast-flowing watercourse, burning in open

containers and return to donor or manufacturer, and transfrontier transfer for disposal [2].

Drugs have been a boon for the humanity in curbing the diseases and if not properly disposed then it is a major stigma to society. Improper disposal of unused/expired medicine can adversely affect the health of human and endangers the life of wild animals which ultimately ruins the integrity of balanced ecosystem. So we must implement that USFDA/WHO guideline in our routine curriculum and healthy practice to avoid nuisance of those unused, expired, old, unwanted medicines [3].

India is hub for many pharmaceutical companies. A high amount of pharmaceutical waste flows through sewage in the water bodies without pre-treatment which endanger the life of aquatic animals and plants, for example, Sterility in frogs due to traces of oral contraceptive pills in water became the cause of decrease in number of frogs & presence of sex hormone in aquatic environment has feminized the male fishes [4]. Improper drug disposal causes various consequences such as accidental consumption of expired drugs by children and animals, stealing of discarded drugs from stockpile or during sorting can be diverted to the market for resale or misuse. On consumption of outdated drugs such as nitroglycerine, insulin, and antibiotics may develop serious adverse drug reaction, and most of the expired drugs due to improper storage condition may lose their efficacy. Burning outdated pharmaceuticals at low temperatures or in open containers may result in release of toxic pollutants into the air. Disposal of non-biodegradable antibiotics, anticancer agents, and disinfectants into the sewage system may kill bacteria necessary for the treatment of sewage [5]. According to the World Health Organization (WHO), the majority of medication was inappropriately prescribed and sold, which leads to unnecessary storage and creates environmental threat during improper disposal.[6,7]. To overcome this problem the proper handling of the expired drugs is imperative. The common preventive step to protect the environment from this kind of pharmaceutical waste is by creating the awareness about proper disposal method to avoid the pollution of environment and their impacts. Most of the healthcare professional including doctors were not aware of proper drug disposal and their impacts. Taken together, this study was planned to study knowledge, attitude & practice towards safe and proper disposal of unused/ expired drugs among resident doctors in tertiary care teaching hospital.

MATERIAL & METHODS:

This was questionnaire-based cross sectional study conducted among resident doctors at Dr Shankarrao Chavan Government Medical College Nanded during January - February 2019.

The study was approved by the Institutional Ethics committee. The sample size of 110 participants was calculated by using Open Epi software, version 3 by

taking hypothesized % frequency of outcome factor in the population (p) as 50% \pm 5 confidence limits as % of 100 (absolute \pm %) (d): 5%. A self-structured questionnaire was validated and distributed to 110 participants after gaining verbal consent from them, sufficient time given them for filling questionnaire and collected back. Before filling out the questionnaire, the importance and purpose of the study were explained to the study participants. The study participants included the resident doctors from all the departments. We excluded the senior residents, house officers, bonded lecturers and interns. Completely filled questionnaires were taken for data analysis. Incompletely filled questionnaire was excluded from the study.

The questionnaire comprised of three parts, in which part I includes questions regarding the knowledge of unused and expired drugs Part II comprises of questions regarding the awareness and attitude towards unused and expired drugs. In Part III, the questions were related to the practices of unused and expired drug disposal. Data were described as a percentage and analyzed using Sigma Graph pad prism version-5 and Microsoft Excel 2007.

RESULTS: Out of 110 doctors to whom we distributed questionnaire; the response rate was 59.09%. Among those, 10% were final year, 35% were of second year, and 55% were first year resident doctors. A total of 65 resident doctors completed the study of which 26 (45%) were female and 39 (60%) were male.

Table no.1 expresses the data related to knowledge of participants towards disposal of unused and expired medications which clearly implies that they are much deficient in knowledge about concerned topic.

Part 1 - Participants knowledge toward disposal of unused and expired medications

Sr.no	Questions	Yes	No
1	Do you check expiry date of medicine?	98%	2%
2	Nature of drug beyond expiry date is toxic & loses its effect?	76.56%	24%
3	Do you know about medication waste?	80.20%	19.20%
4	Do you ever read the guidelines for proper disposal of unused/ left over/ expired medication are laid down by WHO and USFDA?	5%	95%
5	Do you know the term Ecopharmacovigilance?	68%	32%
6	Do you know about "drug take back system"?	88%	12%

Most of the participant's i.e 98%, prefer to check the expiry date before using the medications. This is because they are the one who prescribe the medicines to the patients in order to cure the diseases and prevent recurrence and adverse drug reactions. At individual level we check the expiry date of medicine for efficacy & potency.

76.56% of the participants viewed that drug loses its effect and became toxic after expiry date. By knowing this participants stop to use those medicines and discard them. 80.20% participants know about medication waste, which now evolving as add on pollutant. 68% of them know the term ecopharmacovigilance & 88% of the participant have an idea of drug take back system which is running in developed countries.

Part 2 - Participants attitude toward disposal of unused and expired medications

Q.A) Do you think unused and expired medicines present potential risks to community?

Q.B) Do you think there is lack of adequate information on safe disposal of unused and expired medicine?

Q.C) Do you think all health care professionals provide advice on safe disposal of unused and expired household medicines?

Q.D) Do you think it is your responsibility to ensure the safety of other living species on earth?

Q.E) Who will be the best for creating awareness for society?

Q.F) Which is the best place to educate the community about appropriate disposal of unused drugs?

Q.G) How could be hazardous effect of unused and expired medicines minimized or controlled?

Figure no.1 shows the data related to attitude, awareness & opinion of participants towards safe disposal methods of drugs. 51.56% & 39% participants were "agree" & "strongly agree" respectively about the opinion that there is lack of adequate information on safe disposal of unused and expired medicine. Also they are of "strongly agreed" i.e 35.3% & "agree" i.e 57.81% with the statement that there is lack of adequate information on safe disposal techniques of unused and expired medicine and 29.68% are strongly disagreed that, all health care professionals provide advice on safe disposal of unused and expired household medicines .48.43% of participants are of opinion that it's their responsibility to ensure the safety of other living species on earth. 88% participants think that best place to educate the community about appropriate disposal of unused drugs is at pharmacy while drug dispensing by pharmacist (91%).

Among them 77% conclude that hazardous effect of unused and expired medicines minimized or controlled by prescribing in quantities and for duration that ensure patient compliance for treatment.

Part – 3 Participants disposal practices toward unused and expired medications

Q.A) Why do you keep unused medications?

Q.B) Which is the most common left over dosage form at your working place & home?

Q.C) By which method you dispose unused & expired medicine?

Q.D) How do you discard expired medicines?

Q.E) Is it necessary to implement "drug take back system" in India?

Q.F) Do you advice to the patient about proper method of drug disposal?

Q.G) Will you participate in drug disposal awareness programme in future?

Q.H) Will you advice and motivate the general public on safe drug disposal?

Q.I) Will you focus on practicing in appropriate methods of disposing the drugs?

Figure no.2 represents the reasons for keeping unused medication retained by participants. Majority of participants i.e 46.88% have left over from previous OTC drugs, followed by Passed expiry date drugs i.e 34.31%. Beside this other crucial reasons for keeping those medications at home are self-discontinuation (29.69%), keep a stockpile in case of shortages (9.3%), give them away to friends (7.8%), adverse drug reaction (6.25%).

The number of left over drugs was given in table no.2. About 60 % of participants possess 1-5 left over drugs at home. The most common class of left over drugs among participants was analgesic (62.50%) followed by antibiotics (61%), antacids (46.87%), multivitamins (37.5%) & antihistaminic (28.12%).

Above all questions are related to disposal practices of participants which were asked in phase 3 of the study. The most common dosage forms retained by participants are tablets, syrups, capsules, topical, and injections i.e 84.38%, 29.68%, 17.18% 12.5%, 6.25% respectively.

The methods followed in safe disposal of medicines were given in figure no .3. Participants (70.13%) felt the proper disposal technique for unused medication is throwing in garbage, so that municipality people collect them. Returning to the pharmacist is considered as acceptable method according to 28% & some participants (14%) used to give medicines to their friends, someone want to discard medicine by flushing down the toilet(6.2%),rinsing down to sink (3.1%). About 98% of participants throw the medicine in garbage without crushing this is totally wrong method of disposal of drugs as per USFDA guideline. 88% of participants never advice participants about proper drug disposal. 92% of participants think that it is necessary to implement drug take back system in India like other developed countries. 79.70% participants states that it is necessary to combine both government and healthcare professionals for creating awareness of safe drug disposal techniques of unused/expired medications.

Majority of participants willing and wishing (98%) to participate in drug disposal awareness programme in future. They show interest in advising and motivating the general public on safe drug disposal (95%),

simultaneously they want focus on practicing appropriate methods (97%) of disposing the drugs by following WHO & USFDA guidelines.

Table 2. Different groups of left over drugs at home

Sr no	Different groups of expired drugs	% of participants
	Analgesics	62.5%
	Antibiotics	60.93%
	Antacids	46.87%
	Multivitamins	37.5%
	Antihistaminic	28.12%

Fig no.1 graph related to A,B,C,D questions

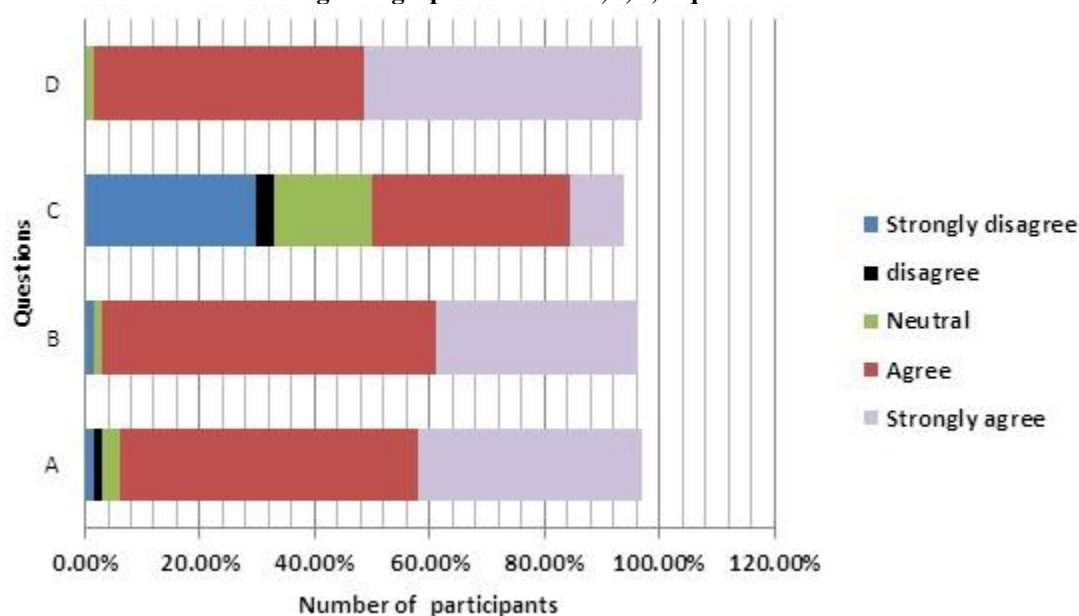


Figure 2. Reasons for keeping unused medications

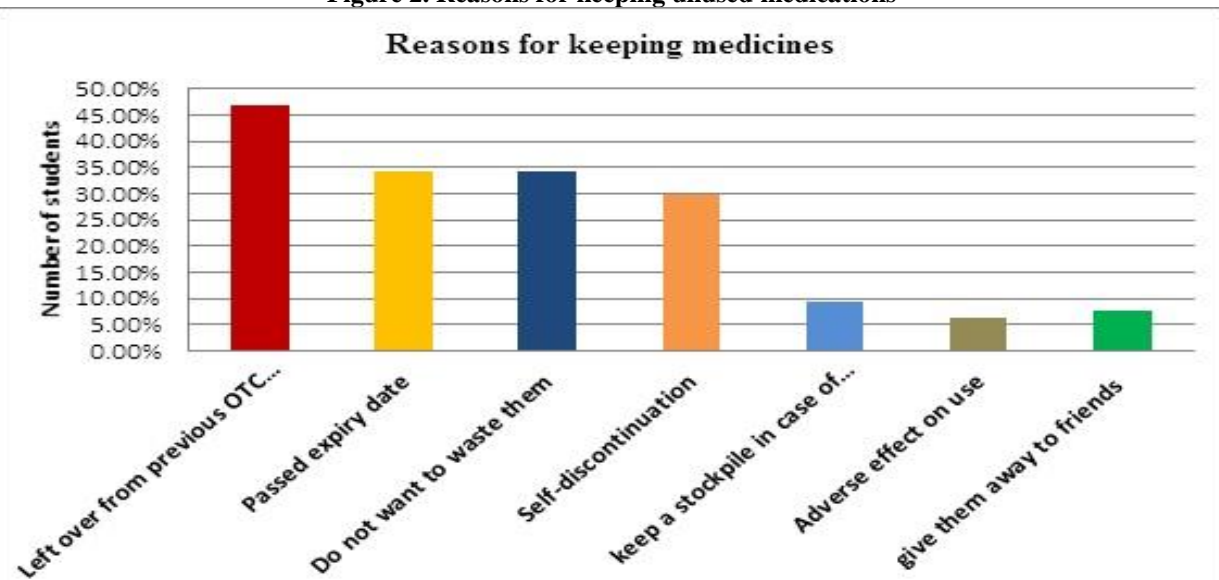
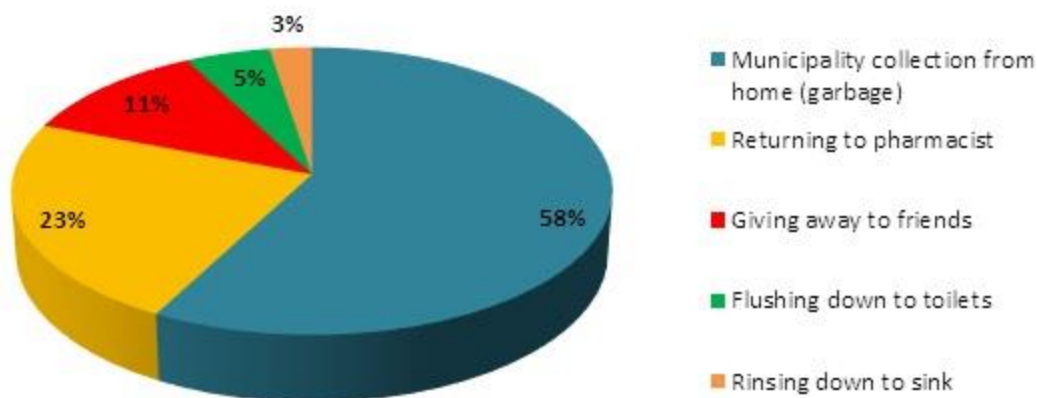


Figure 3. Method of disposal of drugs among residents
Drug disposal methods



DISCUSSION:

Appropriate & proper knowledge regarding safe drug disposal techniques are leading factors to prevent environmental contamination of drug, however guidelines for proper disposal of unused/ left over/ expired medication are laid down by WHO and USFDA [1,2].

The medicines used for common ailments are stock piled by us for emergency usage. Many times these expire and most of us are unaware of the consequences of improper disposal of medicines and the methods adopted for safe disposal.

In our study, most of the participants checked the expiry date before using the drugs. We observed that the awareness to check the expiry date among the participants were 99% when compared to 78% of awareness in a similar study by Umamageshwari et al [8].

Most of the resident doctors (76%) are under the impression that the effects of the drugs are toxic beyond its expiration date. Wide-range of drugs is not toxic when expired, but indeed lose their effectiveness over time. Similar study was done by Sangeetha R et al, but study group chosen by her was health care professionals and medical students [9].

In our study, self-discontinuation followed by left over the counter drugs, keep a stockpile in shortage, adverse effect on use were the some common reasons for piling up of expired drugs which was in accordance with the previous studies done by Annavarapu S et al [10].

In this study, the common types of medications kept by participants were analgesics (62.5%) followed by antibiotics (60.93%), most commonly in the form of tablet (84.38%), syrup (29.68%) followed by capsules (17.18%), topical (12.5%). This may be due to high prevalence of self-medication practice among resident doctors. The

increased presence of antimicrobials at home should get serious consideration since it may add up to the problem of antimicrobial resistance, addictions, accidental poisoning by children. Similar KAP study was done by Ayele Y et al in Ethiopia on large population of Hidar city [11].

Regarding method of disposal of expired drugs in the present study, almost 70.13% and 6.2% of the professionals follow throwing in their household bins and flushing in toilets and only 28% return the drugs to the medical store, whereas in the study conducted by Swaroop et al., 65% and 9% of the professionals throw in the garbage and sink or toilets, respectively [12]. There are number of similar studies conducted which shows resemblance with above results i.e studies done by Umamageswari A[8], Sangeetha R[9], Annavarupa S[10], Azad MAK[13]. In this study, the participants perception towards the drug disposal was throwing in a dust bin so that municipality staff collect them. Majority felt that they were unaware of consequences of improper drug disposal.

Around more than two third of respondents (98%) in the current study discarded or was willing to discard the expired pharmaceuticals in its original package and dosage form. Similar finding was reported by Ahsaan A et al.[14] This approach is contradicting with recommended ways of discarding expired medicine. For example, FDA[1] recommends crushing or dissolving in water and deletion of all personal information from medicine packaging. This approach is very important since it can prevent the drug re-utilization by scavengers.

Majority of participants (98%) know about medication waste and didn't ever read (99.5%) the guideline for proper disposal of unused/expired medicine laid down by WHO and USFDA. They (68%) didn't know

the term ecopharmacovigilance. They (88%) are of opinion that best place to educate the community about appropriate disposal of unused drugs is at pharmacy while drug dispensing by pharmacist (91%).

Just more than half of the respondents (39%) “Strongly agreed” & (59.56%) “agree” about potential risks related to that presence of unused and expired medicines at home. Further, 35.3% of the respondents also “strongly agreed” & 57.81% “agree” that there is lack of information on safe disposal practices. They (43.70%) are of the strong opinion that all health care professionals provide advice on safe disposal of expired/unused medicines and it’s their responsibility (95.30%) to ensure the safety of other living species on earth.

With regards to drug take back programs, the participants gave opinions where 95% participant said programs should be mandatory were “strongly agreed” about the importance of the program. Majority of them realise that, they never advice proper drug disposal techniques to patients hence they willing to advice, practice (88%) & participate (97%) in drug disposal awareness programme in future. Government officials should initiate various community drug take-back programs with strict regulations should be followed at central & state levels till proper disposal of expired drug happens.

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CONCLUSION:

Knowledge about proper disposal of drugs is still lacking in resident doctors due to lack of proper guidance for safe disposal which renders them vulnerable for such practices, owing to this syllabus for drug disposal technique must include in the medical, dental and pharmacy curriculum. All health care professionals (doctors, nurse, pharmacist, and medical students) should undergo compulsory internship training to understand and learn about drug disposal techniques. Discussion on this topic can be given priority in CMEs, conferences, and seminars. Awareness programme should be conducted periodically to all the healthcare professionals to practice as well as advice and motivate the general public on safe drug disposal. Media like television, social networks should be used to propagate the challenges to the environment due to improper disposal drugs of the disposal.

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