



(RESEARCH ARTICLE)



Practice and awareness about unused and expired drug disposal among village people and city people in Bangladesh

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GSC Biological and Pharmaceutical Sciences, 2023, 24(03), 132–139

Publication history: Received on 02 August 2023; revised on 09 September 2023; accepted on 12 September 2023

Article DOI: <https://doi.org/10.30574/gscbps.2023.24.3.0377>

Abstract

Medical waste is dangerous and infectious. Prior to final disposal, it needs special handling because it poses substantial risks to the environment. The issue is getting worse as there are more hospitals, clinics, and diagnostic labs rising up all throughout Bangladesh. The majority of individuals do not know how to properly dispose of their unused or expired medications. The purpose of this study was to determine how well-informed city dwellers and villagers in various regions of Bangladesh were regarding the practices for discarding unused and expired medications. This study used a structured questionnaire and face-to-face interviews to conduct a descriptive, cross-sectional study. A total of 200 true questionnaires with a 100% response rate were returned. The all respondents (200) fell into one of two categories: city dwellers or villagers (n = 100; 50%). More than half of city dwellers and villagers expressed a nearly same attitude towards storing medications at home. Analgesics and gastrointestinal agents were the two classes of leftover medications that were most frequently used. Alarming, 94 (47%) of the respondents said they typically dumped their unused medications in the dustbin. However, roughly 45% of respondents felt that it is crucial for chemists to provide patients with advice on how to properly dispose of their medications. There are gaps in routine drug disposal procedures, necessitating the development of pharmaceutical waste management systems that are both affordable and supported by government regulatory agencies and public awareness campaigns. Patients should receive training from healthcare professionals and neighbourhood chemists on proper medication disposal procedures.

Keywords: Disposal; Risk; Medicine; Environment

1. Introduction

In Bangladesh, the overall drug use is rising daily[1]. Since Bangladesh has a large number of reputable pharmaceutical companies, a dense population, and affordable access to practically all types of medication, its annual medication consumption must be higher than that of any other nation. But the majority of the time, these recommended medications go unused for a variety of reasons, such as brand name changes in prescriptions or treatments, drug adverse effects, and patient condition improvement leading to abandonment of the treatment regimen. For reasons of safety, antibiotics and other prescription medications in particular should only be re-used while a doctor is there to supervise you[2]. If medications are disposed of improperly, they might harm the environment if they are unused or expired. Along with many other nations in South and South Asia, Bangladesh lacks any recognized state regulations or standards for the disposal of unwanted and expired medications[3]. Due to this, a lot of people in Bangladesh use irresponsible methods to get rid of unwanted medicines, such as putting them in the trash, the sink, or the toilet without considering the repercussions. Given that it immediately jeopardizes public safety as well as environmental health, this type of disposal should be strongly prohibited. Similar to this, unwanted medications that are thrown in the toilet, sink, or trash can contaminate surface water by mixing with it. Since the drug mixes are hazardous to aquatic life, this type of water pollution puts the entire aquatic ecosystem at danger. For instance, the active ingredient in a common oral contraceptive, ethinyl estradiol, interferes with fish sexual development and feminization at trace amounts[4]. In

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addition, numerous studies show that the presence of antibiotics in water routes affects the bacteria that are there and may result in antibiotic resistance [5]. In the long run, people and marine life may be genetically impacted by this antibiotic resistance in microbes [6].

To stop more damage to the environment brought on by improper drug disposal, necessary actions can be taken, such as calculating the total amount of unused drugs that are dumped in landfills or water systems, establishing rules for the proper disposal of the drugs by policymakers, and strictly enforcing them across the nation. Due to a lack of knowledge about the potential environmental harm and unintentional poisoning that can result from improperly disposing of household medications, medical waste management and disposal are currently a less talked-about subject in Bangladesh. Drugs that are not properly disposed of represent a threat to the environment by contaminating the water, air, agricultural goods, and food supply,



Figure 1 Consequences of improper disposal of drugs, source: google

As well as endangering livestock and other animals. As a result, research on this topic has been done globally in an effort to develop policy solutions. However, to date, this study is the first in-depth, detailed investigation into drug disposal practices and awareness among undergraduate students in Bangladesh from the pharmacy and other disciplines.

2. Material and methods

2.1. Study design

It was a descriptive, cross-sectional study, and 12 questions from a pre-validated structured questionnaire were utilized to carry out the survey. Males and females between the ages of 20 and 60 were included in the study population, which also included residents of two underdeveloped villages and urban dwellers from Sylhet and Dhaka.

2.2. Questionnaire design

The questionnaire was divided into two pieces. A common type of leftover drugs, reasons to keep medications at home, age, sex, and the subject of study were all covered in the first portion of the questionnaire that asked for personal information. In the second section, participants' practices, knowledge, and attitudes regarding the disposal of unused and expired medications were evaluated. Among the questions were how they handled leftover solid and liquid medications, whether they were familiar with the recommended drug disposal procedure, whether they were aware of the environmental risks associated with improper drug disposal, what, in their opinion, could be the best way to raise awareness, and the significance of chemists and pharmacists in health sectors.

2.3. Data collection

Only those participants who expressed a desire to participate in the survey were given a questionnaire to complete. After gathering all of the responses, potential responders were given an explanation of the study's significance and goal. Following completion, replies to the questionnaires were gathered for statistical analysis.

3. Results

This survey included 200 respondents in total. None of the 200 people that were approached declined; they all reacted. The response rate from respondents was thus 100%. 53 (26.5%) and 147 (73.5%) of the 200 respondents were women and men, respectively. The respondents ranged in age from 20 to 60. The population aged 20 to 35 made up (74%) of the total.

Table 1 Demography of study population

Variables & categories	Number of responses	Percentage (%)
Classification		
City people	100	50%
Village people	100	50%
Age		
20-35	148	74%
More than 35	52	26%
Gender		
Men	147	73.5%
Women	53	26.5%

Practice toward medicaments storage and disposal: More than half of city dwellers and villagers expressed a nearly same attitude towards storing medications at home. Analgesics and gastrointestinal agents were the two classes of leftover medications that were most frequently used. Alarming, 80 (40%) of the respondents said they typically dumped their unused medications in the trash. The majority of both groups (77.6%) said they store medications in case they need them later. The following are typical justifications for keeping medications are-

- Do not know what to do (5.1%)
- Do not know how to dispose (13.2%)
- Do not want to waste it (4.1%)
- In case they are needed later (77.6%)

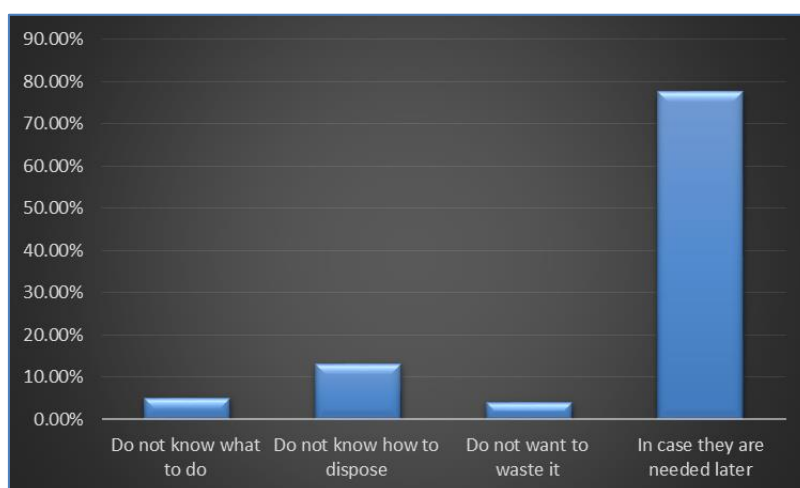


Figure 2 Percentage of justification

13.2 % respondent confirmed that they did not know how to dispose of drugs. On the other hand, only about 4% of respondent did not to want to waste it. Analgesics had the largest prevalence of remaining medications overall (n=181; 27.6%), followed by gastrointestinal agents (n=174; 26.6%), figure 3. (44%) of city dwellers and (20%) of village respondents aspiring medical professionals found a substantial difference in the frequency of wasted antibiotics. Out of 200 respondents, 94 (47%) respondents usually threw their leftover medicines in the dustbin, (figure 4).

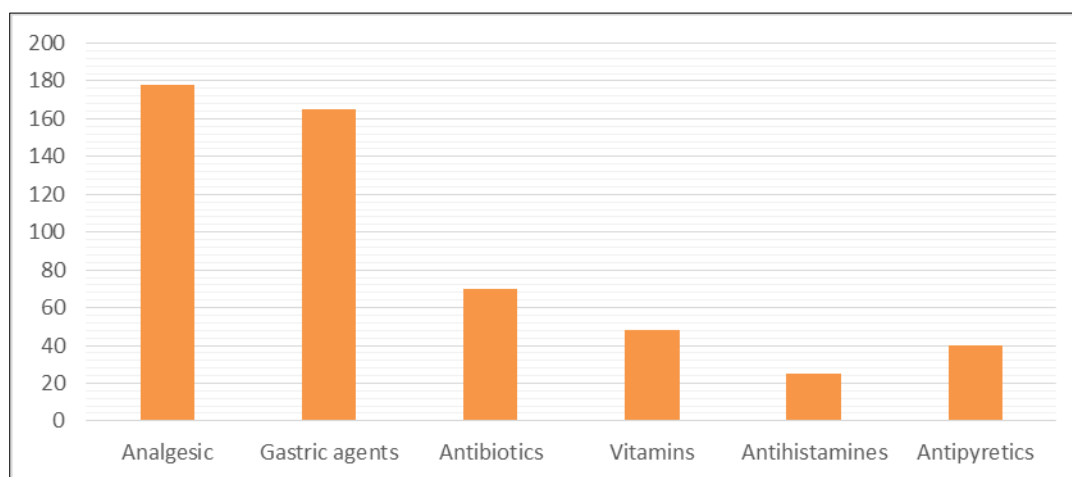


Figure 3 Frequency of different common classes of leftover medicines at home

The second prevalent option for disposing expired liquid prescriptions by the window and burnt fire was selected by a sizable number of (21%) participants. The disposal practices of both city and village respondents are not significantly different under the influence of various dosage types (solid/liquid).

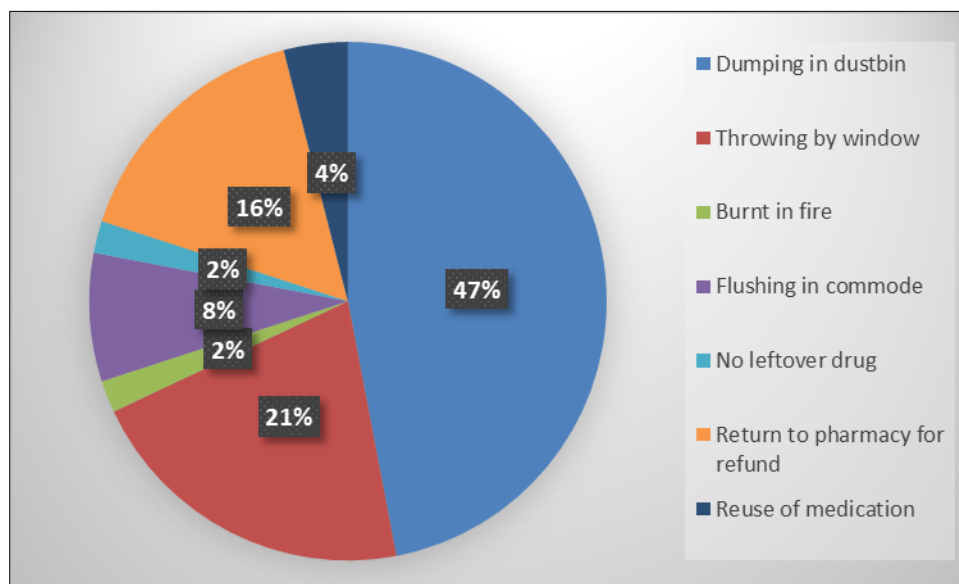


Figure 4 Medicine disposal pattern scenario in Bangladesh

A significant number of respondents said they have no drug take-back programs in their community. The responses of the general public and those with higher education did not differ significantly. A statistically significant amount of knowledge (p0.01) and awareness (p0.01) differences were found between the two types of answer categories using the Pearson Chi-square test.

Table 2 Respondents' attitudes and knowledge about the disposal of unused or expired medications

Questions	Options	Number of response (%)
Do you have any drug take-back system in your society?	Yes	17%
	No	83%
Have you ever heard about the standard drug disposal method of medicines?	Yes	31.5%
	No	68.5%
Do you know about the environmental hazards because of the improper disposal of medicines?	Yes	66%
	No	34%
What do you think would be the best source of awareness about proper drug disposal for our society?	TV & internet	52%
	Doctor	16%
	Newspaper	09%
	Pharmacist	23%

More than half of the respondents (52%) chose the internet and TV as the most effective methods, and about 23% of people proposed assigning chemists as the second most demanding technique, to raise awareness about correct drug disposal practices. In addition, fewer individuals chose doctors (16%) and newspapers (9%). It is clear from the findings that approximately 70% of respondents supported hiring pharmacists, while 23% suggested that pharmacists might be able to fix the problem. On the other hand, 10% responded that pharmacists are not necessary in this situation.

4. Discussion

The result of this study has demonstrated that the majority of persons between the ages of 20 and 60 do not know how to properly dispose of medicines. The results of this study showed that Bangladeshi people's knowledge and awareness of how to properly dispose of leftover household drugs are seriously poor.

It has been observed that responders maintain a variety of medications that pose a risk to the public's health, including analgesics, antibiotics, vitamins, antihistamines, gastrointestinal agents, and antipyretics[7]. In Bangladesh's capital city of Dhaka, a recent survey of households reveals that only 94% of respondents claimed to be taking medication as directed by a doctor, and that 32% of respondents purchased antibiotics, sedatives, and sex stimulants without a prescription[8]. Worrying parallels between the outcomes of that study and those surrounding drug disposal practices were found in this investigation. Nearly 67% of respondents in Dhaka Metropolitan do not know how to properly dispose of drugs.

Similar circumstances existed years ago in some wealthy nations. According to a US study, 98% of respondents kept unopened prescription medications at home. However, a National Prescription Take-Back Day is being observed to collect unneeded medications since the Drug Enforcement Administration (DEA) was established[9]. The situation is worse in developing and poor nations, though. Even while the majority of participants in an Ethiopian survey (58%) were aware of the risks associated with incorrect drug disposal and preferred FDA and WHO disposal techniques (75%), this was not in line with standard Ethiopian practice. About 21% were utilised to store leftover medication at home[10]. Another study in India found that 73% of customers tossed away expired medications in household trash along with other waste, accounting for 96% of consumer disposal[11]. Even though a survey in Kabul, Afghanistan, found that 98% of the respondents were aware of the harmful effects that incorrect drug disposal practices had on the environment, approximately 77.7% of them just threw away unwanted medications in household garbage[12]. A study among 143 families from urban and rural settings together in Serbia showed that the most common drug disposal method was throwing into the garbage (80.3%), even though half of them were aware of the harmful consequences of their exposure to the environment[13]. Another study in Saudi Arabia discovered that 28% of participants were accustomed to keeping unused and undesirable medications at home, while just 33% of them did so[14].

It is time for stringent legislation to be put into effect in order to stop such malpractices. Using a kiosk, gently tossing them in the trash, mailing or returning unused medications to the pharmacy, washing out liquid medications, and using a disposal kiosk are some disposal options[15]. To enable the return of redundant medications in a pharmacy, producers

ought to employ tamper-resistant cartons. Syringes, saline bottles, ampules, vials, and tubes are just a few examples of medical equipment that must be carefully and promptly disposed of after use. For a developing nation like Bangladesh, burning of pharmaceuticals at high temperatures (i.e., above 1200 C) without proper emission control is not viable[16-17].

People should be informed about the need for proper drug disposal before undertaking any interventions. The pharmacies are already in charge of managing medications and may advise on the best kind of disposal technique. They can store narcotics and get rid of them as a volunteer effort. There might be specialized government services in some areas that offer to collect and get rid of narcotics. Sometimes a pharmacy or a government agency will offer a method of sending medications to a specific drug disposal facility[18]. Although flushing pills down the toilet can lead to drug pollution, it may be a legitimate approach to quickly get rid of dangerous medications. To prevent accidental poisoning, we should flush potent painkillers like OxyContin down the toilet as soon as they are no longer necessary[19]. Proper prescription adherence is a requirement for adhering to a dosage schedule and ensuring the responsible use of medications. Assuring this will significantly reduce the accumulation of useless medications. Several doable strategies could reduce the errors of incorrect drug disposal. These include: raising awareness among the general public through the use of all forms of media (print, electric, and social), policy-making by the appropriate body for legislation and regulation, collaborating with climate activist organizations or groups to enable leftover medicine disposal campaigns, including detailed instructions and warnings about safe disposal of medications on labels and secondary packages, promoting returning medications to pharmacies, and leftover medication disposal.

This is so because chemists spend a lot of time during their school studying safe drug usage and disposal techniques. Pharmacists may save lives in an exponential way by raising awareness of the negative impact that incorrect drug disposal has on the environment, the ecology, and everyone's health[20]. Disposal of drugs raises questions about how to best safeguard both human and ecological health[21]. The pharmacies are already in charge of managing medications and may advise on the best kind of disposal technique. They can store narcotics and get rid of them as a volunteer effort. There might be specialised government services in some areas that offer to collect and get rid of narcotics. Sometimes a pharmacy or a government agency will offer a method of sending medications to a specific drug disposal facility[22]. This research study was conducted to find out how these individuals in Bangladesh currently dispose of household medications and how well-informed they are about them. The study sought to produce preliminary data on practises for disposing of leftovers and home medications as well as awareness of the effects. It is hoped that the study's findings will raise knowledge of proper drug disposal procedures in homes and interest in and focus on the need for applicable rules among legislators.

Limitations of study

Only a few individuals and some general city dwellers' ideas were included in this study by the authors. However, it was unable to conduct a poll on the opinions of the general public across a wide range of communities, to find out how they genuinely view the problem of drug disposal practises. Additionally, the government activities that may be used to prevent improper drug disposal practises, such as social campaigns and public health campaigns, were not discussed in this study. The government can establish a monitoring organisation to carry out its duties in relation to this drug disposal issue. In Canada, a medication disposal programme was started, while New Zealand established its Disposal of Unwanted Medication Properly campaign. These nations can serve as inspirations for Bangladesh. Given the variety of drug administration methods, improper drug disposal practices can seriously harm the ecosystem. By default, the ecology can be changed, as can the environment, plants, and animals. Concerns about the environmental effects of pharmaceutically active compounds have been noted by the European Environment Agency (EEA) as a significant growing problem. However, the authors didn't address how a healthy environment might be changed or how improper disposal of unwanted and expired medications can cause environmental behaviour to change. Therefore, from the standpoint of a future researcher looking into environmental difficulties related to drug disposal practises, this could be a crucial aspect. This situation could be improved by a number of practices, including policy-making by the appropriate body for legislation and regulation, involving climate activist groups or institutions to enable safe leftover medicine disposal campaigning, including specific information and warnings regarding safe disposal of medicine in the label and secondary packages, encouraging the return of medicine to pharmacies, and left over medicine collection through crowdfunding, etc.

5. Conclusion

The situation in developing nations like Bangladesh is really upsetting. The safe and secure disposal of leftover medications in Bangladeshi households is not currently a concern for either government agencies or pharmaceutical corporations. Prior to 2019, there was no system for disposing of unused over-the-counter medications. The ecosystem

is seriously threatened when medications are dumped in the environment without following any safety protocols. Prudent and prompt action is needed to fix this situation, which can be started by informing the general public about the avalanche of negative effects associated with improper drug disposal through print, electronic, and social media. Increasing household awareness of the detrimental effects of accidental drug exposure and inappropriate disposal will open the door for the responsible authority to take action and adopt regulations. According to this study's findings, holding seminars by the government-regulated medication administration, environmental scientists, doctors, and chemists could be crucial in increasing public knowledge. In addition, educational campaigns and workshops can inform medical professionals like doctors, nurses, and community and hospital chemists. Along with them, it also found that newspapers and electronic media were preferable for spreading awareness.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest regarding this paper.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Availability of data and materials

The data and materials used to support the findings of this study are publicly available.

Author contribution

All author contributed significantly to design and development of this work.

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