



DISPOSAL PRACTICES OF UNUSED AND EXPIRED MEDICATIONS AMONG THE GENERAL PUBLIC IN SOUTH DELHI

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Abstract:

Background: Most of the medicine users remain unaware about the disposal of unused and expired medicines. The aim of this study was to know the disposal practices of this unused and expired medications in general public in south Delhi.

Method: This was a descriptive cross sectional survey conducted online by using a pre-validated questionnaire. The responses collected were checked for accuracy and SPSS version 23 was used for the statistical analysis.

Result: Response from a total of 393 individuals was collected. The respondents belonged to different professions. The study found that the majority of respondents, about 93% of them, had some kind of unused and expired medication while about 80% of the respondents admitted to stocking of medicines for future use. Among the respondents 14% said that they have unused medication because there was a change of medication and 28% said that they shared their medication with friends and family. 82% of the respondents discarded the unwanted medications in to the dustbins. Almost the entire sample (98%) felt that improper disposal of unused and expired medication can have an adverse effect on the environment.

Conclusion: The study indicates that the level of awareness among the general population of south Delhi regarding the disposal practices of unwanted medications is low, and there is a need for an appropriate method for disposal of unwanted medication. Hence, guidelines on safe methods of collection and disposing of unused medication needs to be introduced.

I. INTRODUCTION

The disposal of unwanted medicines from households is becoming an increasing problem for local and national health and environmental authorities. New Delhi is one of the biggest cities in India with a population of 16.8 million according to the 2011 census report ^[1]. This city alone produces about 8700 tonnes per day of waste ^[2] according to the latest available trend report released by Central Pollution Control Board (CPCB). Out of this, about 5900 tonnes per annum is purely medical waste ^[3].

Pharmaceutical waste containing medicine and its various compounds from the domestic households is mainly generated due to improper practices followed by the people for disposal of expired, or unwanted medication which has been contaminated, or medication which is no longer required. The most common method, and perhaps the easiest, adopted by people to dispose the unused or expired or leftover medicine is either by flushing it down the toilet or draining it in the sink. The other way the handling of unused medicines have been found to be dangerous is sharing. Patients who have been cured of an illness and have left over medicine with them have been found to share it to other members around them. This has led to a significant number of cases of side effects and childhood poisoning. Bashaar M. et al, in their paper published in 2017 quoted the World Health Organization (WHO) report, that more than half of all the medication is incorrectly prescribed and sold which leads to its unnecessary storage and hence creates an environmental threat ^[4]. Other reasons for unnecessary medicines getting stocked up at home are patients' negligence, failing to take the medicine correctly or not completing the full course of medicine. The handling and disposal of unwanted medicines from domestic households is becoming an increasing problem for human health and the environment likewise.

In India, the treatment of pharmaceutical waste water discharge is done as per the guidelines prescribed by the Central Pollution Control Board (CPCB). However, Dr. Banwari Lal, Senior Director, The Energy and Resource Institute (TERI), in his interview to Press Trust of India in May 2018 ^[5], pointed out the flaws in the aforementioned guidelines. He said that the current guidelines don't take into account antibiotic residues and thus the effluents discarded from the pharmaceutical industries is not monitored.

The current guidelines that are available in India from Central Pollution Control Board (CPCB) only talks about treatment of pharmaceutical waste water discharge. There are no guidelines available for the general public to handle the pharmaceutical waste that is generated from domestic households. Whenever there is a concern related to unused and expired medication handling and storage, patients and family members need to be given clear guidance about its disposal.

In some countries, programs were designed to specifically address the issue of proper handling and disposal of unused and expired medication. An international working group was set up in France by WHO's European Centre for Environment and Health to produce a practical guide for addressing the problems of health care waste management in developing countries [6]. Similarly, in New Zealand the DUMP (Disposal of Unwanted Medication Properly) campaign [7], the ENVIRx disposal program in Canada [8], a DUMP (Dispose of Unwanted Medicines and Pills) campaign in the UK and a 'dump' campaign in the US [9] were launched. In the Republic of Serbia, the medical stores and pharmacies that dispense medicines are obliged by the law to accept the return of unused and expired medicines from the general public. This is segregated as pharmaceutical waste and returned to the source of manufacture or distribution where operators are specially trained to collect, handle and transport this waste for destruction [10]. In Mexico, government initiated programs have been launched to collect pharmaceutical waste from domestic households and waste governing laws have been implemented making it the responsibility of the manufacturer, distributor and the hospitals dispensing the medicine to dispose of expired medication [10].

Given the lack of a standardised set of guidelines available to the general public to follow proper disposal practices for unused and expired pharmaceuticals and minimal information available on any research or study done in this area in India, this thesis will aim to study and fill this gap by analysing the current practices and attitude of the general population of south Delhi towards disposing unwanted medicines and recommending methods to minimise its impact on human health and environment. The thesis will also be helpful to the policy makers to understand the problem in detail and design a structured guideline which can be made available to the general public in the most convenient way possible.

II. METHODS

This was a descriptive, cross-sectional survey, conducted through an online pre-validated structured questionnaire. A number of literatures were reviewed to develop the questionnaire. The language of the questionnaire was English. The questionnaire included respondents' practices and attitudes concerning unused and expired medication disposal. Participation in the survey was voluntary. The study was conducted in south Delhi from January to June 2020. The study population consisted of respondents from either gender which included students, medical professionals, public and private sector employees and their families who were the local residents of south Delhi. The data of 393 responses was obtained from our online survey. All returned questionnaires were double-checked for accuracy and then the collected data were fed into a Microsoft Excel spreadsheet. Then the cleaned data was transferred to Statistical Package for Social Science (SPSS) version 23 for analysis. Descriptive statistics (descriptive, crosstab, bar graphs and pie charts) were used.

III. RESULTS AND DISCUSSION

The disposal practices of unused and expired medication from domestic households is becoming the concern of the day. Improper methods can pose a threat to the environment by polluting the water, soil and even the air. Pharmaceutical waste finds many different ways to get into the environment, mainly due to the lack of awareness in the people in general and the lack of proper regulatory laws in the country. The study examined the practices and attitude towards the disposal of unwanted medication of 393 individuals of south Delhi. The survey was not restricted to any particular group of people. The respondents belonged to varied professions.

Table 1: Profession of the respondents

Profession of respondents	Count	Percentage
Healthcare professional	30	7.6%
Medical student	29	7.4%
Working professional (Non-medical)	245	62.3%
Homemaker	23	5.9%
Non-medical student	30	7.6%
Other	36	9.2%
Total	393	100%

The study found that a majority of the general population, about 93% of the people, have at least some kind of unused or expired medication at home. The major contributing factor was that the medical condition was resolved (58% of all the reasons). There could be a lot of reasons which led to medicines being left over after the medical condition was resolved. One of the major reasons is possibly the carelessness of the patient who is going through the medicine course. In India, it is usually observed that a lot of people stop taking medicine as soon as the symptoms of the illness start fading off. It has been observed that most of the people do not undergo the full course of medication. For example, an anti-biotic medicine is prescribed for 6 doses spread over three days. The patient usually stops the medication

at the end of the second day as soon as the symptoms improve. This results in the rest of the medication remaining unused. This is dangerous for the patient as their body tends to develop resistance against the given anti-biotic if the full course of medicine is not completed. Another version of this is carelessness or forgetfulness, where patients are not carefully taking all the medicines they are required to at the correct time or in the correct dosage amount as prescribed. After a while, when the symptoms improve, they discard the medication and it remains unused. Similar behaviour was observed in a study conducted in Ghana where about 59% of the respondents were fully drug compliant. But the rest of the respondents discontinued their medication when they started feeling better^[11]. The biggest risk of having such medicines stocked up at home is the temptation to consume them if similar symptoms are observed without seeing a healthcare professional. This can lead to poisoning and other side effects which can be harmful to the body.

Currently in India there is no control over the purchase of prescription medicines. People have a general tendency of holding on to the prescription even after a particular medical condition has resolved and the same prescription is used over again at the medical stores and pharmacies without regulation to buy stocks of the same medicine. Such practices will need to be curbed by putting in government regulations over dispensation of medicines.

About 80% of the respondents in this study, who admitted to stocking up medicines, did so because they believed that the medicines could be used in the future. In one study done in Kuwait, 16% of the respondents were found to be obtaining medicines without prescriptions and according to the author it was an underestimate of the population as only respondents from government health institutions were sampled^[9]. Another relevant aspect that results in leftover medicines getting accumulated at home is because of dispensing of excessive medicines more than required for the given medical condition. In the study about 14% of the respondents said that they had unused medicines remaining at home because there was a change of medication. The reason for this can be attributed to the doctors who are working on the patient's medical condition. Improper diagnosis is one of the main reasons.

Currently in our country there is no central database that is shared between hospitals and healthcare facilities that can track the history of patients. If the history of a patient is stored centrally, it will always be easier to diagnose the current medical condition and hence prescription of medicines will be more accurate thus resulting in lesser chances of change in medication.

28% of the respondents in our survey admitted to passing on the unused medicines to people in their circle and about 43% of the respondents were those who had shared medicines once in a while. When the respondents were asked about what they did with the unused medication that was left at home, apart from passing it on to friends and family, less than 28% of the respondents thought about disposing the unused medicine in a more environment friendly way rather than simply storing at home. Only about 15% of all the respondents returned the medicines to the pharmacies or medical stores and about 12% of the respondents donated the unused medicines to public welfare. This trend is alarming. Such behaviour needs to be promoted by government by putting into place campaigns and programs that provide easy methods to the general public to dump their unused medication at a pharmacy or medical store or donate it. In studies conducted in various other parts of the world, similar behaviour is observed. The percentage of people returning unused medicines to the medical stores or pharmacies is very low. In Karachi, about 12% of the respondents returned the unused medicines to the medical store^[12], 17% in Kuwait^[9], and only 4% in Ghana^[11]. This number was up to 22% in UK and about 11% in the USA^[10].

The risk associated with pharmaceutical wastes entering the ecosystem have a huge impact on the environment in the long run. Over the last 10 years, hundreds of different compounds have been discovered in the water bodies around the world, which includes fluoxetine, gemfibrozil, and ibuprofen to name a few^[13]. According to the 2013 World Health Organization and United Nations Environmental Program Report, many countries, including developing countries, are at risk of serious health risks due to the presence of pharmaceutically active agents in the water bodies^[14, 15]. In the light of these findings, throwing away unused solid medications in the trash bins along with other household waste, or flushing them down the toilet or sink is considered to be the least desirable way of disposal of unused and unwanted medication.

In terms of the knowledge about the impact of improper disposal practices on the environment, the respondents seemed to be well aware with about 67% of them agreeing that it can have a negative effect on the environment and people's health. But this should not be considered as a positive sign. There was still a large group of people who were unaware of the hazards. This is the group that needs to be targeted to spread the awareness.

The government needs to revise its existing policies and framework on handling of the pharmaceutical waste that is generated from the domestic households. New laws need to be put in place for the general public to follow in order to minimise the impact on the environment. Large scale campaigns need to run in order to make more and more aware of the hazards of disposing unused and expired medication in a non-sustainable way. Apart from the government's involvement, respondents preferred doctors, pharmacies and pharmaceutical companies to take it in their hands the task of spreading awareness among the general public.

IV. CONCLUSION

The study indicates that the level of awareness among the general public of south Delhi with respect to the disposal practices of unused and expired medication is very low. The government should issue stringent guidelines and take responsibility for spreading awareness among the general public about the hazardous effects of improper disposal of unwanted pharmaceutical waste on the environment which in turn will also affect the human health. Moreover, healthcare professionals, including, but not limited to doctors, nurses, pharmacists, environmentalists, are in an excellent position to educate their patients, followers, friends and family first-hand.

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