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Original Research Article

A study to assess the knowledge and awareness regarding safe disposal of pharmaceutical wastes among 2nd year medical and para-medical students in a tertiary care teaching hospital in North India

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ABSTRACT

Background: The use of pharmaceutical products in our day to day life is escalating and one cannot deny their presence in every household. Unfortunately not all the medicines that reach our homes get consumed. Unused, unwanted and expired drugs get accumulated over time and are generally disposed along with other household trash thus contributing to environmental pollution. This turns our attention towards the significance of eco-pharmacovigilance. Assessing the level of knowledge and awareness of students under training as health care professionals regarding safe disposal of pharmaceutical wastes can help us to partly assess the magnitude of the problem of inappropriate disposal methods and help us to plan and initiate steps to prevent the hazards caused by improper disposal of these items.

Methods: A questionnaire based cross-sectional study was conducted among medical and paramedical students of a tertiary care teaching hospital using a pre-validated questionnaire from previous studies.

Results: Majority of the participants were not aware of the possible hazards of improper disposal of pharmaceutical wastes. They expressed the need for awareness programs regarding the subject.

Conclusions: The study revealed the practice of drug accumulation at home. The disposal methods opted by the participants were not the recommended methods. There is a need to address this issue through awareness programs at various levels.

Keywords: Awareness, Eco-pharmacovigilance, Knowledge, Pharmaceutical products, Safe disposal

INTRODUCTION

At present, a lot of pharmaceutical products are being used for diagnosis, treatment and prevention of health conditions. However, a significant amount of these products lie unused and expire within the households giving rise to the problem of medication accumulation. Storage of unwanted or unused medication in the household provides an opportunity for misuse and abuse.¹ Medication accumulation may be attributed to self-

discontinuation on clinical improvement, oversized medication package, change in prescription due to side effects or lack of therapeutic effect, poor adherence, fear of adverse effects and forgetfulness.^{2,3} These ultimately find way into the environment through excretion into the sewage system or directly from manufacturing unit or via trash or flushing.⁴ Few consequences encountered due to such environmental contamination are a decline in the number of vultures, sterility in frogs and feminization of male fishes.^{5,6} Studies show that the presence of

antibiotics in the environment may lead to antibiotic resistance.⁷ There are specific guidelines formulated by National Formulary of India, 2011, which specifies disposal of unused medicines.⁸ WHO gives guidelines for safe disposal of unwanted pharmaceuticals in and after emergencies.⁹

In spite of these specific guidelines the practice of improper disposal of pharmaceutical wastes is evident. This draws attention to the significance of eco-pharmacovigilance which can be defined as the science and activities concerning detection, assessment, understanding and prevention of adverse effects or other problems related to presence of pharmaceuticals in the environment which affect humans and other animal species.¹⁰

This study was conducted to assess the knowledge and awareness regarding safe disposal of pharmaceutical wastes among medical and para-medical students as this study group can be easily sensitized and involved in patient education and giving them first-hand information on safe disposal of drugs.

METHODS

This was a questionnaire based cross sectional study. The study population consisted of 120 medical and para-medical students. A pre validated questionnaire from previous studies was used for this assessment.¹¹ It consisted of 12 questions pertaining to the number and type of medicines found in their homes, reasons for their presence, the methods of disposal adopted, their awareness about hazards of improper disposal and their opinion regarding means of spreading awareness about safe disposal of pharmaceutical wastes. Ethical clearance was obtained by the institutional ethics committee and the study was conducted in Mahatma Gandhi Memorial Medical College, Jamshedpur, Jharkhand between July and August 2019.

RESULTS

A total of 120 students participated in this study. 68 were paramedical and 52 were medical students. Majority (53%) of participants responded that they had 1-5 unused and left-over medicines in their houses, 29% had 6-10 drugs, 14% had 11-15 left over drugs. 40% respondents had topical drugs at home, 25% had analgesics and antipyretics, 24% had antibiotics and 8% had vitamins and syrups. Topical preparation of drugs was the most common dosage form in every household followed by tablets capsules and syrups (Figure 1 and 2).

Majority of respondents (65%) had no information about how to dispose unused and unwanted medicines resulting in their disposal in garbage. The most common reason for drug accumulation at home was self-discontinuation after improvement in patient's condition followed by expiry of drugs then left over medicines from over the counter

purchase of medicines. 35% respondents were aware of the adverse outcomes of pharmaceuticals in the environment whereas 65% were unaware (Figure 3).

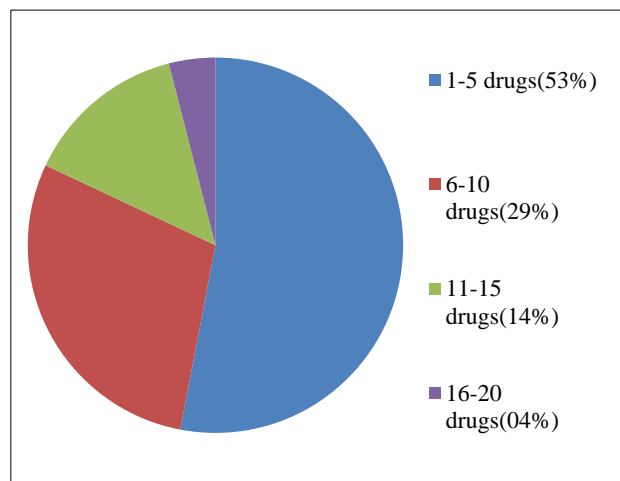


Figure 1: Unused/leftover drugs at home.

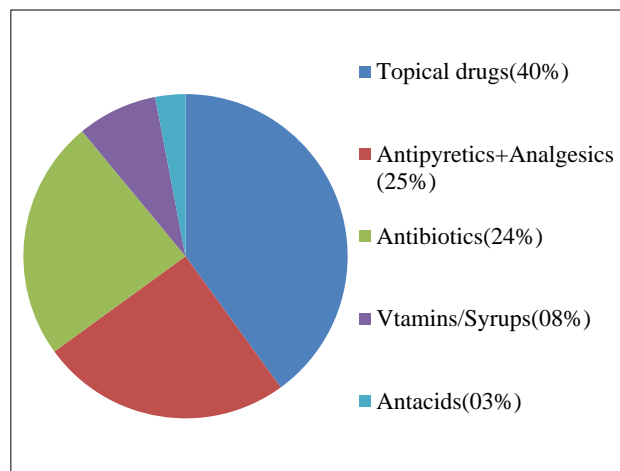


Figure 2: Class of unused/expired drugs present at home.

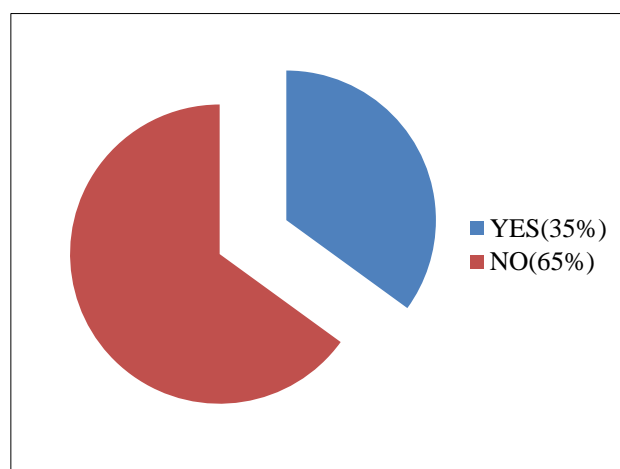


Figure 3: Awareness regarding adverse outcomes of pharmaceutical in the environment.

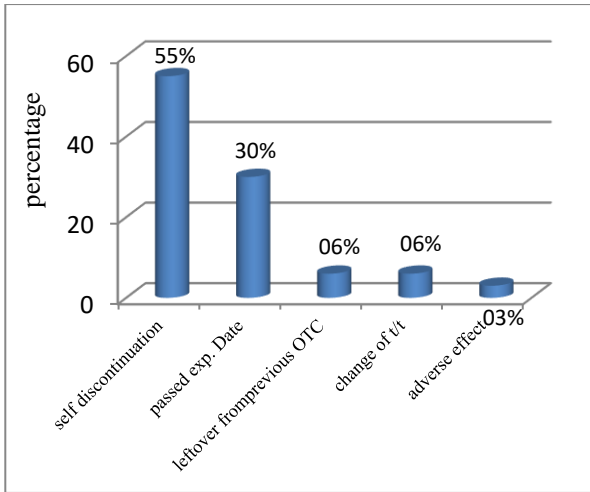


Figure 4: Reasons for possession of unused medications at home.

The most common method of drug disposal was throwing in garbage followed by flushing in the toilet. 66% respondents opined that the most acceptable method of drug disposal was returning to the pharmacist 32% respondents opined that municipality collection from home was the most acceptable method for this purpose. Awareness about drug take back program was negligible (4%) (Figure 5 and 6).

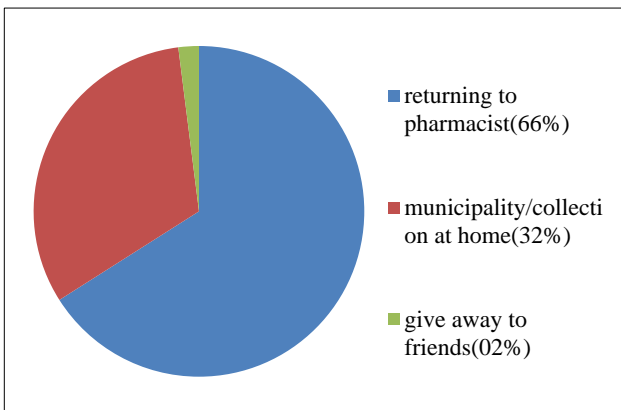


Figure 5: Acceptable methods to dispose medicines.

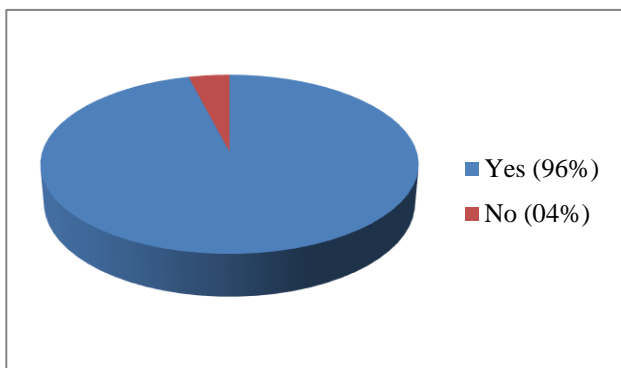


Figure 6: Awareness about drug take back program.

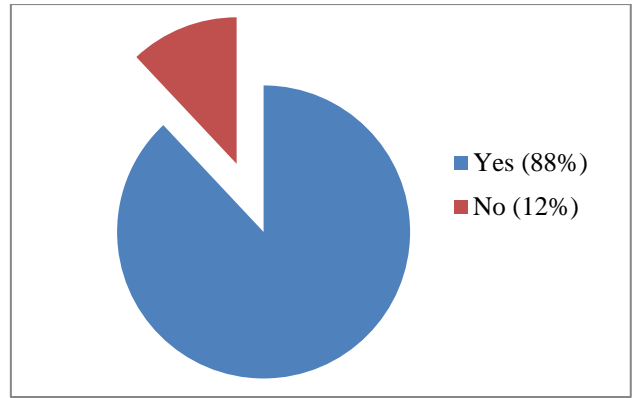


Figure 7: Need for a program to collect unused medicine from home.

Majority (88%) respondents expressed the need for a program to collect unused medicines from home. All the participants responded in affirmative to the question regarding need for awareness programs for consumers. 46% respondents suggested that awareness programs must be conducted by the government whereas 41% thought that patient education should be done by health care professionals (Figure 7).

DISCUSSION

This study was done to assess the knowledge and awareness regarding safe disposal of pharmaceutical wastes among medical and para-medical students in a tertiary care teaching hospital in North India. The study was inspired by the rising concern about the problems arising due to improper disposal of pharmaceutical wastes leading to environmental loading of pharmaceuticals. Previous studies have shown that even low concentrations of pharmaceuticals in the environment have harmful effects on animal and plant life seen in the form of renal failure in vultures, impairment of reproduction in fishes or inhibition of growth of certain aquatic species.¹²⁻¹⁴ One possible solution to this problem is to create awareness regarding consequences of improper drug disposal and encourage a more responsible behavior towards the environment.

In this study we found that keeping medicines at home was a common practice. Non adherence to treatment leading to expiry of drugs and over the counter purchase of drugs for self- medication were the most common reasons for medication accumulation. Sensitizing people about reduction in pharmaceutical waste generation can be the first step towards dealing with the problem of disposal of unused drugs. In this study topical drugs were the most common dosage forms found at home. This was contrary to the findings of similar studies where tablets were the most common dosage forms at home.¹¹ This can be explained by the fact that dermatophytosis is one of the most prevalent public health problems in developing countries like India. The casual health seeking attitude and lax drug control policies in India are facilitating over

the counter (OTC) topical medication abuse. In India FDC creams are easily available OTC, are cheaper and give quick symptomatic relief due to the anti-inflammatory property of steroids in them.¹⁵ Therefore topical formulations could be a popular choice among people with skin problems.

Majority of respondents had no information regarding recommended methods of disposal of pharmaceutical wastes and the adverse outcomes of their improper disposal. Majority of the respondents disposed medicines by throwing them in garbage followed by flushing it in the toilet. Similar findings were obtained in previous studies conducted in South India.¹⁶ Eco-pharmacology is a new concept and an emerging science and its significance needs to be stressed among health care professionals.

A large portion of the respondents thought that returning the unused or expired medicines to the pharmacist followed by municipality collection from home were the most acceptable methods of drug disposal. USFDA initiated the Drug take back program on September 25th 2010 with the co-ordination of Drug Enforcement Administration. Drug take back programs are common in UK and Sweden.¹⁷ In this study awareness regarding drug take back program was negligible as evidenced by other studies as well.¹⁸ Drug take back programs should be popularized through public awareness. A significant section of respondents expressed the need for a program to collect unused medicines from home. Every respondent felt the need to create awareness about this issue among consumers and majority wanted the government to be involved in it whereas others thought it would be beneficial to involve health care professionals in educating consumers in safe disposal of medicines.

Students belonging to both the streams (medical as well as para medical) demonstrated that their knowledge and awareness regarding this problem was inadequate. This further emphasizes that even people involved in health care are ignorant about the recommended methods of drug disposal.¹⁹

CONCLUSION

It can be concluded from the present study that drug accumulation is practiced in every household but people are not aware of the potential hazards that may be caused by their improper disposal. Even students in health care profession have inadequate information and do not practice the recommended methods of drug disposal. Creating awareness and inculcating the habit of safe disposal of drugs among health care professionals can promote spreading information on safe disposal of drugs among other members of the community as well. Reduction in waste generation is equally important as is proper disposal. Better strategies are needed to deal with this problem like implementation of drug take back programs and incorporation of green pharmacy which

means taking responsibility for the environmental impact of medicines.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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