

Knowledge and disposal practises of unused and expired medicines among medical and dental undergraduate students

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Abstract

Background: Majority of the patients do not consume their medicines exactly as prescribed and thus leave behind unused medicines at the place of stay. The improper disposal of these unused medicines has led to environmental as well as health hazards.

Objectives: To assess the knowledge, awareness, and practice of the first and second year medical and dental undergraduates towards the disposal of unused and expired medicines.

Methods: This descriptive cross-sectional study was conducted among 206 medical and dental students of a medical college in Kathmandu valley, Nepal. Data were collected by census method from 2022 March to 2022 May after ethical clearance. It was based on an online structured questionnaire to assess the knowledge, awareness, and practice about the disposal of leftover medications. Data analysis was done using Microsoft Excel 2016.

Results: A total of 206 students participated in the study of which 161 (78.2%) were from MBBS and 45 (21.8%) from BDS stream. It was noted that 118 (57.3%) students obtained their medicines on prescription, 76 (37.1%) directly from the counter, and 11 (5.3%) obtained from their friends or relatives. Majority (179, 86.9%) of the students checked the expiry date before buying the medicines, 134 (65%) students were aware about the harmful consequences of inappropriate disposal of medicines on health and environment.

Conclusion: Proper knowledge on disposal practises of unused and expired medicines among medical and dental students' needs much improvement. Educational interventions may help improve awareness of proper methods of medicine disposal.

Key words: Disposal; Knowledge; Medicine; Practice.

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INTRODUCTION

Safe and proper disposal of unused and expired medications has been a major issue globally. The improper disposal of pharmaceutical waste is causing serious effects on environment, ecosystem, and has effects on human health.¹ Medicines bought for different illnesses are sometimes not completely consumed by the patients and get expired.² These unused and expired medicines remain as a medicinal waste in the place of stay. World Health Organisation (WHO) has stated that more than half of all medication is inappropriately prescribed and sold that leads to unnecessary storage and creates environmental threat.³ Due to the lack of proper guidelines for safe disposal of unused and expired medicines in developing countries like Nepal, people usually dispose the medication waste in whatever ways they think is the best.⁴ Tons of municipal solid waste are generated from expired and unused medicines.²

Self medication is prevalent among medical and dental students. These may increase the chances of sharing

their medicines with friends as well as improper disposal of unused and expired medicines. Hence this current study was conducted to assess knowledge, awareness, and disposal practises of unused and expired medicines among medical and dental undergraduates.

METHODOLOGY

It was a descriptive cross-sectional study conducted using an online questionnaire among medical and dental undergraduate students of Kathmandu Medical College in Sinamangal, Kathmandu, Nepal. The data were collected using Google Forms (Alphabet Inc.) from March 2022 to May 2022. Ethical approval was obtained from Institutional Review Committee of Kathmandu Medical College (Ref. 2211202102) prior to the commencement of the study.

Census Method was applied for sample collection and online sample size calculator was used for determining sample size. Total 161 students of I and II Bachelor of Medicine and Bachelor of Surgery (MBBS) and 45 students from Bachelor of Dental Surgery (BDS) participated in the study. The study population was chosen irrespective of their gender and age. Those students who did not fill the online questionnaire within the data collection period were excluded from the study. Informed consent was taken from the students prior to the study using the consent forms. The purpose of the study was explained to the participants and their confidentiality was ensured. The information was given to the students through online portal as well as they were informed about purpose of the study in the classrooms before the conduction of the study. Self-administered, semi-structured, validated questionnaire covering the various domains that is knowledge, awareness, and practice of disposal of leftover medications were used. Questionnaire was framed by including the necessary information required to achieve the objectives and the questions were developed using simple language. The questionnaire included reasons for drug under-utilisation, the most common class of leftover drugs and dosage form, the method of drug disposal, awareness of consequences of improper drug disposal, and the best place to educate them regarding proper drug disposal techniques. It was validated by asking the faculty member to go through the questionnaire and after that a pilot survey on 30 students from the study group was conducted.

Since different groups of students were enrolled in the study, the response from students came gradually hence this time was taken even if it was an online study. The data from the Google forms were saved in Microsoft Excel Sheet 2016 format and further analysis was done.

RESULTS

A total of 206 students participated in the study of which 161 (78.2%) were from MBBS and 45 (21.8%) from BDS stream. The study showed that 109 (53.2%) students consumed the medicines exactly as prescribed to them while 96 (46.8%) did not. It was noted that 118 (57.3%) students obtained their medicines on prescription, 76 (37.1%) directly from the counter, and 11 (5.3%) of obtained from their friends or relatives.

The commonest reason for stockpiling was drug left unused due to excess purchase. Antipyretics and analgesics were the commonest class of medicines that remains unused or expired at place of their stay, the antimicrobials and anti-allergic medicines came in the third, and fourth positions. Tablets (128, 62.1%) were the commonest dosage form that remained unused, or expired at place of stay (Table 1).

With regards to the leftover medicines, the students were not sure about what to do with the medicine leftover. Thus, most of them discarded them in household garbage or gave the medicine to friends and relatives (Figure 1).

The majority (179, 86.9%) of students responded that they checked the expiry dates before buying the medicines. Following the expiry of the bought medicines, most of the students discarded the medicines in household garbage (Figure 2).

A total of 134 (65%) students were aware about the harmful consequences of inappropriate disposal of medicines on health and environment. The study also indicated that 112 (54.4%) students were unaware about the impact of medicines wastage on economy whereas 96 (46.6%) were aware of it. With regards to the impact of improper disposal of medicines 83 (40.3%) students were aware of increase in virulence in microorganisms and consequential development of antimicrobial resistance. A total of 59 (28.6%) students responded that medicinal waste is linked with misuse of medicines. The majority of students felt that the schools and colleges are the best place to educate the community about the appropriate disposal of unused or expired drugs (Figure 3). A majority of the students 186 (90.3%) believed that the government could do more to decrease the medication wastage in the nation. The students had a mixed opinion on who is best suited to work on medical waste, their answers varied from educational institute to hospitals, individuals to medical professionals and government.

Table 1: Commonest dosage form that remain unused

Dosage form	n (%)
Tablets	128 (62.1)
Ointments	38 (18.5)
Syrups	27 (13.1)
Creams	13 (6.3)

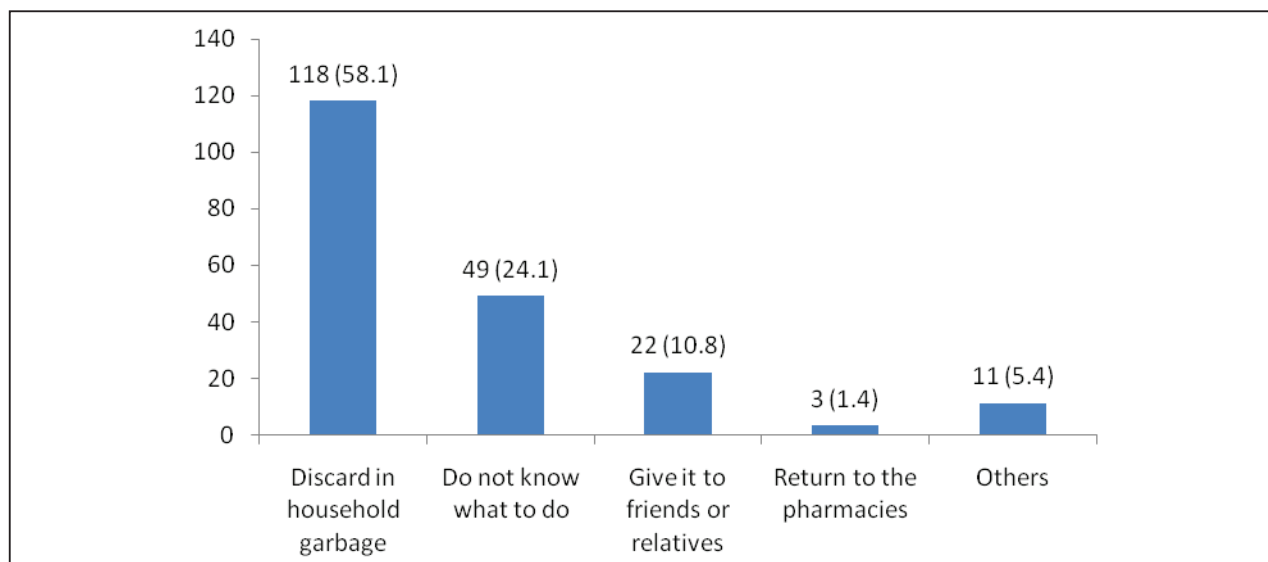


Figure 1: What do the students do with unused medicines, n (%)?

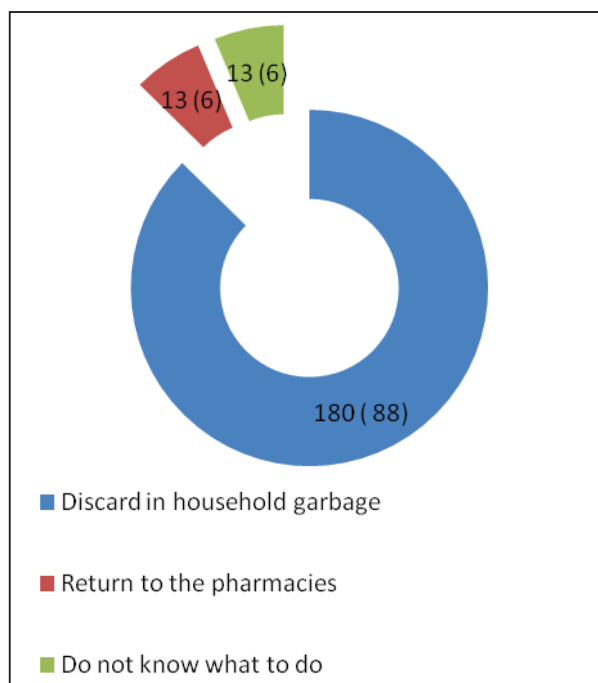


Figure 2: What do the students do with the expired medicines, n (%)?

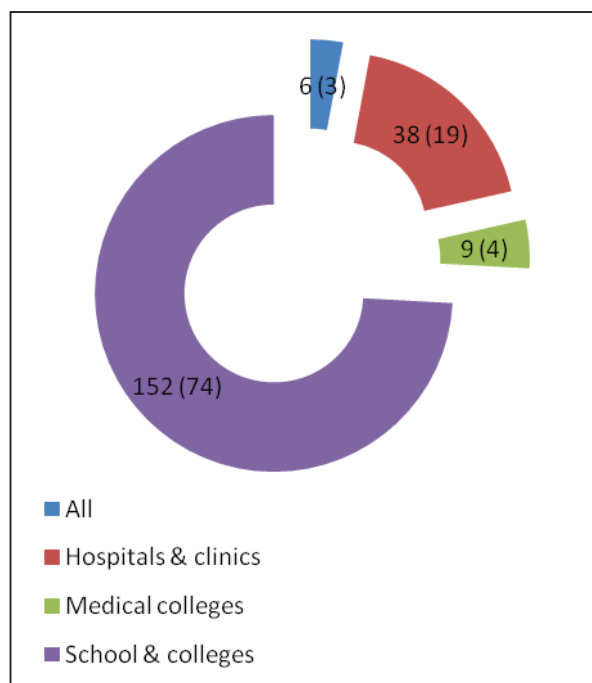


Figure 3: Best place to educate the community about appropriate disposal of unused or expired drugs

DISCUSSION

With the increase in the use of medicines, there is realisation of the impending ill effects of the unused medical waste on the ecosystem.⁴ Many countries have devised strategies on the proper disposal of unused and expired medicines. Lack of adequate knowledge on improper disposal practises are rising among medical students of tertiary care hospitals and teaching institutes. Some earlier studies conducted among undergraduate students in Nepal have also shown a poor knowledge and pointed out that the current practice of safe disposal methods are inadequate.⁵

The study found that analgesics/antipyretics were the commonest class of medicines that remained unused or got expired at their place of stay. This is similar to the study conducted in Western Nepal. This could be possibly be because the students can easily obtain analgesics from the pharmacies without a proper prescription.⁵ In this current study 95 (46.3%) respondents replied with antipyretics as the commonest class of unused drug which is in contrast to the study conducted in Harar city, Ethiopia where analgesics (62.4%) were the commonest group. This contrast may be due to difference in geographical location as well as difference in the study population.⁶

In the current study, the most common dosage form that remained unused or expired was tablets, which matches with the study conducted by Gaikwad et al. (54.5%).⁷ In this current study, 157 (76.2%) of the respondents have unused medicines at the place of their stay. Unused medications contribute to self-medication. The practice of self-medication among students is a common problem in Nepal.^{5,8} Possible reason for self-medication among medical and dental students is the easy availability of drug information sources and medicines. These students also thought that they know enough about medicines and health conditions. So, they find it appropriate to self-medicate and often advice others to use over the counter (OTC) medications. Medical and dental undergraduate students find it easy to purchase medicines from the local pharmacies but due to the lack of their knowledge on the illness they will over purchase the medicines and this can also lead to storage of medicines in their place of stay.

While the medicine leftover was common, there was also trend of borrowing medicines from friends or relatives or purchase of medicines over the counter. Due to inadequate knowledge regarding the proper disposal of medicines there is a trend of giving the unused or expired medicines to the relatives or friends as well as borrowing

the medicines from. So, this seems like a vicious cycle which can be stopped following the proper disposal of medicines, in that the proper disposal of medicines stops this chain or cycle.

Medications come with expiration dates and the drug expiration dates indicate the date at which the drug potency begins to diminish below an acceptable limit. It is a legal requirement, that the date of expiry and date of manufacture should be mentioned on the label of all the pharmaceutical products. The expiry date should be checked before buying the medicine as it determines the full potency and safety of a drug. According to the Department of Drug Administration (DDA) guidelines of 1986 A.D., it is necessary that the pharmaceutical products should have the date of manufacture and date of expiry on their label.⁸ The current study showed that 179 (86.9 %) students check the expiry date before buying which is similar to the study conducted in North India where 95% of the respondents check expiry date before buying.⁹ In this study it was shown that 134 (65 %) students were aware about the harmful consequences of inappropriate disposal of medicines on both the health and the environment. Inappropriate disposal of the medicines particularly in open areas can act as a possible source of toxic agents after disintegration that may either increase antimicrobial resistance or precipitate the adverse drug reactions due to unnecessary exposure. They can even act as a toxin if disposed in rivers which affects the lifecycle of the aquatic animals.

A study conducted on patients opinion regarding disposal of unused medicines showed that 45% of the patients showed the awareness on harmful effects of improper drug disposal.¹⁰ The most common method of drug disposal as seen in this study is throwing it in to the household garbage (57.8%). Nipa et al. compared studies from various regions and showed that all over the world people preferred to throw unused drugs in dustbin rather than disposing them in a proper way.¹¹ This is similar to the study conducted in Luska, Zambia among medical students where 60% of the respondents discard the unused medicines in household garbage.¹² In a similar study conducted in Kathmandu by Jha et al. showed that one-third of the students disposed the unused medicines in garbage.¹³ However, this finding is contrast to the study conducted at Greater Noida, India which showed that landfill was considered to be useful for safe disposal of medicines. In the same study 25% of the participants suggested that chemical decomposition, incineration, and return to the manufacturer are safe methods of drug disposal. This contrast may be due to the difference in knowledge regarding the disposal practises.¹³

It is necessary that every country should have guidelines for proper disposal of unused and expired medicines that encourages its people to dispose these medicines properly.¹⁴ Nepal has developed guidelines for the management of health care waste in health care institutions, but it still has to develop guidelines for the general population and needs to work on spreading awareness on the issue of pharmaceutical waste management.

Proper disposal system of the unused and expired medicines is important to ensure the safety of the mankind and the environment. It is crucial to formulate, adopt and implement the policy of drug take back system for proper disposal of unused medicines.¹⁵ A few countries are already practicing the drug take-back program,¹⁴ The pharmacy is best suited as a focal point for the collection of unused medicines and the pharmacist can play a pivotal role for the proper disposal of unused medicines.¹⁶

A follow-up study could be undertaken to see whether the study participants' awareness levels have improved. It was felt that frequent continuing medical education programmes on the disposal of expired and unused drugs at the institutional level must be regularly conducted. It is contemplated that the findings of this investigation would lead to other prospective pharmaco-epidemiological studies which will further validate the

findings.

CONCLUSION

From this study it was observed that medical and dental undergraduate students were aware of the expiry of medicines and knew about the harmful effects of inappropriate disposal practises of unused and expired medicines. However, their knowledge and awareness regarding proper disposal methods of medication waste needs to be improved. Places like school, colleges, and hospitals should conduct awareness program on proper disposal of medication waste. Creating awareness in the public can be done by educating them through charts and posters and disseminating this kind of information to the people visiting the hospitals. Videos can also be developed and played in patient waiting areas to spread awareness among the patients. The drug take-back system should be initiated in community pharmacies, firstly in bigger cities and then slowly to more far flung areas. The pharmacies should paste posters of such services being made available at their pharmacies. Similar studies in other health professional institutions and in other regions are also required to improve the awareness regarding the proper disposal of medication wastage.

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