ORIGINAL ARTICLE

A Survey on Medicine Disposal Practice among Households in Yogyakarta

Susi Ari Kristina[1], Chairun Wiedyaningsih[1], Azan Cahyadi[2], Bai Athur Ridwan[2]

[1]Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia, [2]Department of Pharmaceutics, Management Pharmacy Graduate Program, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

Abstract

Introduction: Improper disposal of unused medications has been a public health problem, as unused drug adversely effects on health and environment. The main objective of this study was to assess the extent of unused medications disposal practice of among household in Yogyakarta Province, Indonesia. **Materials and Methods:** A survey-based cross-sectional study was used. Households were conveniently selected and interviewed using structured questionnaires. Attitudes and practices regarding medicine disposal were asked and list of unused medicines found at home was recorded. The data were analyzed and presented descriptively. **Results:** Of 324 household surveyed, majority of respondents (85%) reported storing unused medications in their home and only 3% reported returning medication to a pharmacy. Antibiotics were commonly medicine kept in home (37%). Predominant reason for medication non-used was disease or symptoms felt improved (97%). Less than half of respondents (41%) have been check the expiry date of their medicine before use. Most respondents (80%) did not get any advice from health professionals. **Conclusion:** Gaps exist in practices of medicine disposal. An effective unused drug disposal system supported by community pharmacists should be provided along with extensive media campaign to educate customers on safe medicine disposal practices.

Key words: Disposal, Indonesia medicine, practices, unused

INTRODUCTION

Unused medicine is defined as any pharmaceutical product that is not fully consumed whether prescription or over-the-counter drugs that can arise from households or health-care activities.[1] Improper medication disposal is a worldwide problem that leads to adverse consequences. It leads to health problems such as ineffective therapy, drug resistance, poor medication non-adherence, prolonged of illness duration, uncontrolled chronic conditions, hospitalization, and overall increases health-care cost spending by both patients and government.[2,3]

There are habits for disposing of unused drugs around the world. Many consumers keep drugs in their home because they want to use those medicines for self-medication practice in the future.[4,5] Leaving medicines lying around in the medicine cabinet poses several risks, which may result in inadequate dosage regimens, sharing drugs with other members of family or neighbors resulting in inappropriate drug use. Medicine kept at home may lose potency due to exposure to heat, light, and higher humidity.[6] In addition, consumers find difficulty to identify the expiry dates at home since drug containers have been removed.[7,8]

Food and drug administration recommends "take-back" program as the best option for drug disposal. Otherwise, almost all medicines can be thrown in the household trash, but only after consumers take the precaution steps enlisted. Take-back program is community-based initiatives that allow public to bring leftover drugs to a central location for proper disposal which is currently regulated only through law enforcement agencies.[9]

Although different studies have been conducted in developed countries to capture the extent of improper medicine disposal,[10] in developing countries, this problem is enormous

Address for correspondence:
Susi Ari Kristina, Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia. E-mail: susiari_k@ugm.ac.id

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and not well documented. Thus, a knowledge gap exists regarding the extent of and reasons for unused medications among households in low-middle-income countries. In Indonesia, medication utilization and expenditures have consistently increased every year. The impact of unused medications on health expenditure also could be substantial. To the best of our knowledge, there is no study conducted in Indonesia setting to capture this problem, and public awareness regarding the disposal of medication is considered low. Hence, the aim of this study was to assess household's practice and awareness of unused medication disposal. This study would also serve as a baseline data for policy-makers to formulate medicine disposal system nationally.

MATERIALS AND METHODS

This study was a cross-sectional observational study on household in Yogyakarta Province, Indonesia. The targeted respondents were residents of three districts, i.e., Sleman, Bantul, and city of Yogyakarta and 18 years of age or older. A household member was chosen based on their presence at home during the period of survey, between April and June 2018. Sampling technique was done on a convenient basis.

Questionnaire was developed based on extensive literature review and was tested for content validity with a panel of four experts in pharmacy practice and psychologists. Pilot testing was conducted to 10 laypeople who were not familiar with the study. A validated questionnaire consisting of seven questions including attitudes toward unused medicine and open-ended questions for practices of households regarding the disposal of unused medicines was interviewed. The observation checklist was prepared to enlist medicines kept at respondent's houses. Both instruments were tested for face and content validity with a panel of three experts and five lay individuals who were non-respondent of the study. This package of survey was administered to a total of 324 households. The study was approved by the Universitas Gadjah Mada Ethics Committee (Approval no. KE/FK/0372/EC/2018). Responses of participants were recorded and entered into Microsoft Excel 2007. Data were analyzed descriptively for frequency and percentage responses.

RESULTS

A total of 324 household surveys were completed. Table 1 gives details on the respondent population. The majority of respondents were women (65%), and average of age was 45 years old.

Table 2 shows responses to the items intended to measure attitudes toward unused medication disposal. When asked, did any quantity of purchase medicine remain unused at their home, all of the respondents confirmed still kept unused medicine at home for future use. Most of the respondents

Table 1: Household characteristics

Sociodemographic characteristics (*n*=324)	*n* (%)
Gender	
Men	114 (35.18)
Women	210 (64.82)
Age (mean, SD)	
Marital status	45.19 (10.23)
Single	75 (23.15)
Married	249 (76.85)
Education level	
Less than senior high school	45 (13.89)
Pass senior high school	184 (56.79)
Graduated from university	95 (29.32)
Insurance status	
Universal insurance	300 (92.59)
Private insurance	24 (7.41)

SD: Standard deviation

Table 2: Attitudes toward unused medicine

Items (*n*=324)	Yes answer, *n* (%)
Did any medicine remain unused at your home?	324 (100)
Is your bought medication covered by insurance	319 (98.46)
Did you check expiry date of your medication	135 (41.67)
Did you receive information concerning the correct disposal of medication	145 (44.75)
Previously got advise from health professionals	65 (20.06)
Improper disposal of unused medicines causes damage of environment	268 (82.75)
Patient is responsible for disposal of unused medicines?	280 (86.42)

medicine purchased were covered by health insurance (98%). Less than half of respondents (41%) have been check the expiry date of their medicine before use. This finding reflects that the public were not aware of the expiry date of medicines. Almost of them (82%) was thought that they were responsible for proper disposal of unused and expired medicines. A large majority of the sample (82%) reported that improper disposal of unused and expired medicines can affect the environment. About 20% reported got advice about how to dispose unused medicines by health professional.

Reasons for medication non-used included disease or symptoms improved (97%), doctor changed the medication and asked to stop earlier medication (45%), did not feel it was

helping the symptoms (37%), or experiencing side effects (24%), and they changed to herbal remedies (18%) [Table 3].

Table 4 contains responses concerning medication disposal practices. More than two-third of all respondents (85%) reported storing unused medications in their homes, and more than half (71%) reported throwing medications in household waste. About 23% of respondent was giving their unused medicine to their friends or neighbors. <20% reported flushing unused medications in the sink or toilet and only 3% reported returning medication to a pharmacy.

Table 5 describes the class of medicine non-used. More than 6000 items were found in respondent houses. Most of these were antibiotics (37%). Topical antibiotics were also found in their house, about 22%. Vitamins and analgesics were kept store, about 11% each. Medication for chronic diseases including antihypertensive and antidiabetic agent was approximately about 8% each, still kept in their house. It reflected excessive buying of over-the-counter these drugs resulted in possession of leftover medications at home.

Table 3: Reasons for unused medications

Reasons for unused medicines	*n* (%)
Symptoms improved and felt better	314 (96.91)
Doctor changed the medication and asked to stop earlier medication	145 (44.75)
Did not feel it was helping the condition	120 (37.04)
Experienced side effects	78 (24.07)
Changed to herbal remedies	60 (18.51)

*Each respondent chose more than one choice answer

Table 4: The way to dispose unused medicine

Way to dispose unused medicine	*n* (%)
Store them at home	278 (85.80)
Dispose in household trash	232 (71.60)
Down in the sink or toilet	56 (17.28)
Give it to others	75 (23.15)
Return it to pharmacy	10 (3.09)

Table 5: Class of medicines disposed in 324 household

Item of medicines	*n* (%)
Oral antibiotics	2450 (36.83)
Topical antibiotics	1509 (22.68)
Vitamins	790 (11.88)
Analgesics	765 (11.50)
Antihypertensive	560 (8.42)
Antidiabetic	578 (8.69)
Total	6652 (100)

DISCUSSION

This is the first study to assess the pattern and factors contributing to the disposal of unused medications among a sample of Yogyakarta households in Indonesia. Misperception about disposal of unused medication was observed, although our respondents' were young aged and high educational background. Reasons for medication non-use such as the symptoms perceived to be improved, or experiencing side effects found consistent with previous studies.[11,12] Law *et al*. found that most of respondents felt their condition resolved (40.4%) as a result of lack of belief that they were needed.[12]

The study finding shows that disposal of unused medicines was improper, with more than 80% of the respondents surveyed keep their drugs leftover at home until expired followed by disposal in household trash. A study in Madigan, the US reported that 45% of all respondents reported storing unused or expired medications in their homes.[13] In India, more than half of surveyed respondent (68%) stored unused medicines at home.[11] A study in Riyadh highlights that 55.3% of respondents were unaware of the consequences of keeping expired medication in the home.[5] The large quantity of unused medications has been attributed to ignorance about their disposal and lack of communication between prescribers, pharmacists and patients, overuse and misuse of prescription drugs, and poor medication adherence, which is potentially adverse effect on health and environment. In accordance with other studies,[14,15] our study found that <20% of respondent ever having been given advice about proper medication disposal by a health-care provider.

Common classes of medicines reported as leftover, unused or expired were antibiotics, which are similar to the practices followed by the people in Afghanistan. More than 95% of the respondents in Kabul had unused medicine stored at home, and most of these were antibiotics.[16] Antibiotics leftover at home could be the result of non-compliance to prescribed antibiotics, overprescription of antibiotics, or antibiotics obtained as a result of self-medication. The accumulation of antibiotics may reflect their intentions to self-medicate with antibiotics. Previous study in Yogyakarta about the use of antibiotics in community found that antibiotics were used to treat a variety of minor symptoms such as the common cold, cough, sore throat, and fever, for mostly <5 days of use. Such practices were based on reasons of previous successful experience, saving time and money, and information obtained from laypeople.[17]

To address the concern of unused medications, it would be beneficial to formulate strategies on rational prescribing practices, improve patients' medication belief and adherence, and promote pharmacist involvement in education on medication disposal. A significant role can be played by community pharmacist in providing proper education and awareness to the community and to prevent economic loss associated with unused medications. Adding specific instructions regarding disposal of the drug, in

the medication label and leaflet have been suggested in previous study conducted in Israel.[18] Public education regarding unused medication disposal is substantial and health-care professionals should provide information to patients on how to dispose unwanted medications and the environmental impact of improper disposal. Government and related stakeholders should establish take-back programs and examining incentives for returning unused medications to pharmacies.[18] National guidelines on the appropriate disposal of unused medications need to be developed and informed to the public.

CONCLUSION

Gaps exist in practices of medicine disposal. The government is responsible to provide safe and cost effective medicine disposal program. An effective unused drug disposal system supported by community pharmacists should be provided along with extensive media campaign to make the people aware of hazardous effects of expired and unused medications.

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