

Household storage of medicines and self-medication practices in south-east Islamic Republic of Iran

B. Foroutan¹ and R. Foroutan²

التخزين المنزلي للأدوية وممارسات التطبيب الذاتي في جنوب شرق جمهورية إيران الإسلامية بهزاد فوروتان، رضا فوروتان

الخلاصة: إن التطبيب الذاتي والتخزين غير الملائم للأدوية في المنزل يشكلان مخاطر صحية محتملة. وقد هدفت دراسة أجريت في جنوب شرق جمهورية إيران الإسلامية إلى تحديد الأماكن التي تحفظ بها الأسر أدويتها، وإلى تقييم وتيرة التطبيب الذاتي ومحدداته. ففي مسح مستعرض أجري عام 2010 تمت زيارة أسر من مناطق مختلفة من مدينة بيرجند (العدد = 500) وتم ملء استبيان شبه منظم. فكانت المسكنات أكثر الأدوية التي تخزن في المنزل شيوعاً، تلتها أدوية علاج نزلات البرد لدى البالغين والمضادات الحيوية. وكانت الثلاجة المكان الأكثر شيوعاً لتخزين الأدوية (50.6%). وتبين أن معظم الأسر لم تطلع على النشرات المدرجة في العبوات. وذكرت أسر كثيرة (53.6%) أنها تمارس التطبيب الذاتي، وكانت وتيرة إعادة استخدام المضادات الحيوية الموصوفة من قبل الأطباء عالية. وكان هناك ترابط كبير بين التطبيب الذاتي والمستوى التعليمي. لم يكن هناك ترابط مع السن والجنس والمهنة ونوع التأمين وكذلك الوضع العائلي. وخلصت الدراسة إلى أن هناك حاجة إلى تحسين معرفة الجمهور ومعلوماتهم بشأن تخزين الأدوية ومخاطر إعادة استخدام أدوية الوصفات الطبية.

ABSTRACT Self-medication and inappropriate storage of medicines at home are potential health risks. This cross-sectional study in south-east Islamic Republic of Iran in 2010 aimed to determine where householders kept their medicines and to assess the frequency and determinants of self-medication. Householders from different parts of Birjand city ($n = 500$) were visited and completed a semi-structured questionnaire. Analgesics were the most common medicines stored at home, followed by adult cold remedies and antibiotics. The refrigerator was the most common place for storing medicines (50.6%). Most householders did not consult the package inserts. Many householders (53.6%) reported that they practised self-medication, and the frequency of reuse of physician-prescribed antibiotics was high. There was a significant association between self-medication and educational level but not with age, sex, marital status, occupation and type of insurance. Better public knowledge and information about storage and risks of reuse of prescription medications is needed.

Conservation de médicaments à domicile et pratiques d'automédication dans le sud-est de la République islamique d'Iran

RÉSUMÉ L'automédication et la conservation inappropriée de médicaments à domicile représentent des risques potentiels pour la santé. La présente enquête transversale réalisée en 2010 dans le sud-est de la République islamique d'Iran visait à déterminer où les ménages conservaient leurs médicaments et à évaluer la fréquence de l'automédication et ses déterminants. Des ménages dans différents quartiers de la ville de Birjand ($n = 500$) ont fait l'objet d'une visite et ont rempli un questionnaire semi-structuré. Les analgésiques étaient les médicaments les plus couramment conservés à domicile, suivis par les médicaments contre le rhume chez l'adulte et les antibiotiques. Le réfrigérateur était l'endroit le plus fréquent pour la conservation des médicaments (50,6 %). La plupart des ménages ne consultaient pas les notices des médicaments. De nombreux ménages (53,6 %) ont affirmé qu'ils pratiquaient l'automédication, et la fréquence de réutilisation des antibiotiques prescrits par un médecin était élevée. Il existait une forte association entre l'automédication et le niveau d'études, contrairement à l'âge, au sexe, à la situation matrimoniale, au métier et au type d'assurance. La population a besoin d'accroître ses connaissances et son niveau d'information sur la conservation des médicaments et sur les risques liés à la réutilisation des médicaments prescrits.

¹Department of Pharmacology, School of Medicine, Shahrood University of Medical Sciences, Shahrood, Islamic Republic of Iran (Correspondence to B. Foroutan: behzad_foroutan@hotmail.com). ²School of Medicine, Shiraz University of Medical Sciences, Shiraz, Islamic Republic of Iran.

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Introduction

Self-medication is a global concern, in both developed and developing countries (1–9) including those of the Middle East (10–12). It has been estimated that about 60–80% of health problems are treated by self-medication (13). This is a practice in which individuals utilize any types and dosages of medication for treating themselves, without professional supervision, to control an illness or an abnormal condition (14,15). Based on the official figures, annual sales of non-prescription products in the United States of America exceed US\$ 31 billion, although these sales represent less than 20% of total spending on prescription pharmaceuticals (16). Concerns about self-medication include sharing prescription medicines with other members of the family, using leftovers from previous prescriptions or disrespecting the medical prescription by prolonging or interrupting the dosage and the administration period prescribed (1).

Inappropriate storage and use of medicines at home could have a direct influence on public health, the environment and the health-care services and it increases the risk of self-medication (17). Previous studies have identified a link between medicine storage and self-medication practices (18). This includes medications stored intentionally while they remain in use or medications that are incompletely used. Storing medicines at home might increase the risk of self-medication, and some authors have reported a high frequency of exchange of self-medication between family members (11). Self-medication is influenced by many factors, such as local legislation and accessibility of medicines; advertisements by pharmaceutical companies; individuals' level of education, number of family members and income; and local societal and cultural norms. One of the main reasons for self-medication is often the financial burden of consulting a doctor. In

economically deprived communities, most episodes of illnesses are treated by self-medication (19), which provides a low-cost alternative for people who cannot afford the high cost of clinical services and also as many medicines in developing countries are dispensed over-the-counter.

The present study in a city in the south-east of the Islamic Republic of Iran aimed to find out where medicines were kept at home, to investigate the frequency and determinants of self-medication among family members and to explore whether or not the medication package inserts were used. The study would inform strategies such as educational programmes aiming to promote public knowledge about medicines. These strategies would help householders to pay more attention to storing medicines at home and raise awareness of self-medication practices.

Methods

Sampling

The study was conducted in March 2010 in the city of Birjand, south-east of Islamic Republic of Iran. A sample of 500 householders were recruited by stratifying the local regions of the city (north, south, east, west and central) into different sections to cover families of different socioeconomic status. Householders from each section were selected through a systematic, random sampling technique to cover all parts of the city. Local authorities were contacted to obtain formal permission to conduct the study and householders were informed in advance about the study to ensure their agreement to participate in the study. Selected households were visited and the data collection supervisors explained the objectives of the study. Heads of households were asked to consent for their home to be included in the study and for them to participate in filling the questionnaires. They were told that their names and those of their

families would not be recorded. Each household was given a code and considered as a unit. When a householder was not willing to participate the next household in the sampling frame was taken until the sample size was reached ($n = 500$).

Data collection

The survey was conducted by 2 students who were trained by the researcher by conducting several household visits in the presence of the researcher before the actual start of the study.

Householders completed a pre-tested, researcher-designed questionnaire which collected data about their demographic characteristics (age, sex, marital status, education, occupation and insurance coverage/organization) and asked about use of medicines at home. They were asked: whether they kept medicines in the house; whether they read the package inserts; where they kept the medicines (refrigerator, kitchen cabinet, bedroom, bathroom, elsewhere); whether they stored prescription medicines for re-use; what kinds of medicines were reused (pain, fever, antibiotics, cold cures, herbal medicines); whether they returned unused medicine to the pharmacy; whether they knew about self-medication; what formulations of medicines they kept (tablets, drops, syrup capsules injections suppositories, creams/ointment); how many times in the past 3 months they self-medicated without consulting the doctor (once, twice, three times, more than three times); and whether they paid attention to the expiry date of the medicines. The questionnaire contained both open-ended questions and questions with a list of possible answers. We defined leftover medicines as medications prescribed by the doctor over the previous 3 months and kept by the householder. Medicine names, strength, dosage form, expiry date and quantity were recorded. We did not record householders' income because most of participants were employed

within a similar range of annual income and there were few unemployed householders. Educational status was analysed in 2 categories: no formal education or primary school only; and secondary school or higher.

Data analysis

The data were reviewed, organized, tabulated and analysed using Microsoft *Excel*, 2010 version. Descriptive analysis was conducted by calculating means and standard deviation (SD) and proportions for continuous and discrete data respectively. The chi-squared and *t*-tests were used to analyse statistical significance. The cut-off for statistical significance was $P < 0.05$.

Results

A total of 500 householders completed the questionnaires: 231 (46.2%) females and 269 (53.8%) males. Table 1 shows their demographic characteristics. Of the householders, 62.8% had completed secondary school or higher levels and 37.2% had no schooling or only primary school level. Most of the participants (73.6%) were married and living with their families, while 26.4% were single. One-third (34.4%) of householders had no insurance coverage/organization to support and cover medication costs and 5.0% of participants were unemployed.

All the households reported that they kept medicines at home. Table 2 shows the places where medicines were kept at home. The most common place was the refrigerator (50.6%) or a kitchen cupboard (42.6%); the remainder kept medicines in the bedroom. None of the households kept medicines in the bathroom. Only 6.8% of the householders said that they had read the instructions in the manufacturers' patient information leaflets (package inserts) and 93.2% did not (some participants admitted that they threw away the leaflets).

Overall, 268 (53.6%) householders reported that they practised self-medication for self-diagnosed disorders or symptoms. Table 2 also shows the most commonly reported therapeutic categories used for self-medication. Analgesics (e.g. non-steroidal anti-inflammatories, paracetamol and its related compounds or combinations such as paracetamol plus codeine) were the main therapeutic group, used by 59.6% of respondents for self-medication. The number of times within the last 3 months that householders had self-medicated themselves and their families with analgesics were as follows: 1 time (19.4%); 2 times (22.4%); 3 times (16.8%) and ≥ 3 times (41.4%). Adult cold remedies were used for self-medication by 11.6% of respondents, antibiotics (left-overs from doctors' prescriptions) by 9.8%, herbal remedies by 9.2% and corticosteroids by 7.0% (Table 2). In answer to the question related to reuse of antibiotics

prescribed by the doctor, one-third reported that they reused them. Of those who reused antibiotics, 70.7% reported that they did not know this type of use was self-medication. The results also showed that tablets were the most commonly used formulation for self-medication (35.6%), followed by capsules (24.4%); syrup (21.4%), ointments (10.8%); ampoules (4.0%) and suppositories (3.8%).

Table 3 shows self-medication practices by age, sex, occupation and insurance coverage/organization name. There was a significant association between self-medication practices and educational level ($P = 0.007$). Respondents with secondary/higher education were less likely to use self-medication than those who had none/primary education only. There was no significant association between self-medication and age, sex, marital status, occupation or type of insurance.

Table 1 Demographic characteristics of participants ($n = 500$)

Variable	No.	%
Sex		
Female	231	46.2
Male	269	53.8
Mean (SD) age (years)	29.4 (1.32)	
Marital status		
Married	368	73.6
Single	132	26.4
Occupation		
Government employee	260	52.0
NGO employee	101	20.2
Housewife	60	12.0
Retired	54	10.8
Unemployed	25	5.0
Insurance cover/organization		
Social security insurance	196	39.2
Iran health insurance	122	24.4
Other health insurance	10	2.0
No insurance	172	34.4
Education		
Secondary school/higher	314	62.8
None/primary school only	186	37.2

NGO = nongovernmental organization.

Table 2 Storage of medicines at home and self-medication practices of participants (n = 500)

Variable	No.	%
Storage place of medications		
Refrigerator	253	50.6
Kitchen cupboard	213	42.6
Other	34	6.8
Consulted package inserts	34	6.8
Practises self-medication		
Yes	268	53.6
No	232	46.4
Frequency of self-medication in last 3 months (n = 268)		
1	52	19.4
2	60	22.4
3	45	16.8
≥ 3	111	41.4
Therapeutic class used for self-medication (n = 268)		
Analgesics	159	59.3
Adult cold remedies	31	11.6
Antibiotics	26	9.7
Herbal remedies	25	9.3
Corticosteroids	18	6.7
Other	9	3.4
Formulation used for self-medication (n = 268)		
Tablets	95	35.4
Capsules	65	24.3
Syrup	57	21.3
Ointments	29	10.8
Ampoules	11	4.1
Suppositories	11	4.1

Discussion

Our study revealed that nearly half of households stored medicines in the refrigerator, whether this was the correct place or not. The correct place for storage depends on the medicine; for example, after preparation of antibiotic suspensions they must be kept cool but not frozen, whereas adult cold remedies should be kept at room temperature in a kitchen or bedroom cupboard. The kitchen cupboard was the second most common storage place. This finding contrasts with that of other countries. In a study in Qatar, for example, most medicines were kept in the bedroom

(20,21). Our findings raise concerns about how medications are stored and disposed of in the community. None of the participants said that they returned unused medicines to a local pharmacy and keeping them in their home could be a risk of potential harm. The refrigerator is not a suitable place for all medicines, and even if, based on the recommendations of the package inserts, those medicines should be kept in a refrigerator, freezing must be avoided. Also it is necessary to ensure that children are not able to get access to medicines that are kept in a refrigerator. Most medicines are sensitive to light and heat, and may need to be destroyed

earlier than the expiry date, or even become toxic, especially antibiotics. Places such as cabinets and kitchen cupboards might be suitable although humidity should also be considered.

Pharmaceutical companies in the Islamic Republic of Iran are required to include a leaflet with medication packages which briefly explains about the drug, its indications and side-effects. This covers most outpatient prescription and some non-prescription medicines and medical supplies. Only 6.8% of householders said that they had read the package inserts.

Even if medicines are stored correctly, it does not mean that these medicines would be suitable for a family member to start self-medication and reuse them. None of the householders in our study reported routinely returned unwanted medications to a pharmacy for proper disposal. Furthermore, a high prevalence of self-medication was noted among householders (53.6%). Muras et al. reported that antibiotic self-medication for respiratory tract infection was common in Poland (22).

Previous studies have documented the link between medicine storage places at home and frequency of self-medication (23,24). Medicines prescribed for one symptom/disease may be used both as self-medication for (repeated) episodes of the same symptom/disease or for a member of the family with the same symptom/disease but not by consultation with a physician. Finding unused prescription medicines in homes in the Islamic Republic of Iran is not surprising because self-medication practices are common among people of all educational levels (11,12,25–27). Other research has found that the majority of householders keep unused medicines at home either to use them in the future or to give them to someone else who has similar symptoms (28). Furthermore, leftover medications may be a result of non-completion to treatment regimens (29).

Table 3 Participants' self-medication practices by demographic data and type of insurance

Variable	Practises self-medication				<i>P</i> -value (χ^2 test)
	Yes		No		
	No.	%	No.	%	
<i>Sex</i>					0.704
Male	142	54.4	119	45.6	
Female	126	52.7	113	47.3	
<i>Age (years)</i>					0.832
20–29	58	50.4	57	49.6	
30–39	69	53.5	60	46.5	
40–49	71	53.8	61	46.2	
≥ 50	70	56.4	54	43.6	
<i>Marital status</i>					0.613
Married	199	54.1	169	45.9	
Single	68	51.5	64	48.5	
<i>Occupation</i>					0.544
Employed	253	53.3	222	46.7	
Unemployed	15	60.0	10	40.0	
<i>Insurance coverage/organization</i>					0.728
Social security insurance	103	52.6	93	47.4	
Iran health insurance	62	50.8	60	49.2	
Other health insurance	5	50.0	5	50.0	
None	98	57.0	74	43.0	
<i>Educational level</i>					0.007 ^a
Secondary/higher	153	48.7	161	51.3	
None/primary	115	61.2	73	38.8	

^aSignificant at $P < 0.05$.

There was a significant association between self-medication and educational level. Lower educated householders were more likely to self-medicate. Self-medication provides a lower cost alternative for people who cannot afford the cost of clinical services (30,31). Based on a study in India, the prevalence of self-medication was 37% in urban and 17% in rural populations (32).

The results showed that stored medicines belonged mostly to 3 categories: analgesics, adult cold remedies and antibiotics. In the Islamic Republic of Iran, analgesics are the most commonly procured over-the-counter medicines and self-medication with them is frequent. They are usually the first-line of medicines used by community members in event of illness

(33). Adult cold formulations (a combination of phenylephrine, chlorpheniramine maleate and paracetamol) are also widely consumed products in the Islamic Republic of Iran. Nearly 10% of households in the present study reported that they used antibiotics for self-medication and one-third reported that reused them. It should be noted that this study refers to antibiotics originally prescribed by the doctor and then kept and reused, as antibiotics are not sold over-the-counter in the Islamic Republic of Iran. This may be in order to save money because antibiotics are expensive to buy. In Saudi Arabian households Abou-Auda found that respiratory medicines, followed closely by central nervous system (CNS) agents and antibiotics, were the most common reused medicines (16.8%, 16.4% and

14.3% respectively) (34). In contrast, a British study revealed that among medicines returned to pharmacies, 28.0% were cardiovascular medicines, 19.1% were CNS agents, 14.8% were respiratory agents, 11.4% were gastrointestinal agents and only 4.0% were antibiotics (35).

Tablets were the formulations most commonly used for self-medication (35.6%). However, it should be emphasized that tablets might be the most frequently used dosage form in self-medication simply because most medicines for self-medication come in tablet form.

It is not surprising that nearly 10% of households kept herbal remedies. Self-medication with herbal preparations is likely to be frequent in south-east Islamic Republic of Iran because people in

this area are proud of their background related to traditional medicine. Previous studies in the Islamic Republic of Iran show that people take herbs as supplements to promote health, prevent illness (especially the common cold), boost the immune system, prevent stress and to supplement regular nutrition and they believe that use of herbs is part of a healthy lifestyle (36,37).

One of the strengths of the present study was that it was carried out in the community and was not based on a specific target group. However, an absence of a standard definition of self-medication and the study design which did not include a comparison group mean the results should be interpreted with caution.

Conclusions

Keeping medicines at home and self-medication are important health issues. Very few householders in our study consulted the package inserts or stored their medicines according to the manufacturers' instructions. It is important for patients to be aware of information about manufacturers' recommended storage conditions for medicines. There is a need for more patient awareness about the safe handling and storage of medicines at home. A high prevalence of self-medication was also noted among householders, especially those who were less well-educated. Doctors have to take into account that their patients are likely

to keep several prescription medicines in their homes. These patients are potential providers to their friends and relatives of medicines that are potentially unsafe for self-medication. Better public knowledge and information about the risks of reuse of prescription medications is needed.

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