Pain Medications in Palestinian Households: Safety and Wastage Analysis

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Abstract

Background and Objective: Inappropriate use and storage of pain medications may cause unnecessary wastage and potential harm. The objective of this study was to investigate the extent of storage, wastage and potential harm of pain medications stored in households in Nablus district, Palestine. **Methodology**: This is a cross sectional, anonymous, questionnaire-based study. The drug product inventory in the surveyed households was investigated and family members were interviewed. Data were coded, entered and analyzed using statistical package for social sciences software (SPSS 16). **Results**: A total of 415 households in Nablus district, Palestine were surveyed. The total number of medications in the surveyed households was 5505; the mean ± SD was 13.3 ± 7.8. The total number of pain medications stored was 1103, constituting 20% of the stored medications. The average number of pain medications was 2.7 ± 1.8 per household. Pain medication storage was not associated with most of the tested demographic variables. More than one third (39.7%) of pain medications were stored in relatively unsafe places around the house within the reach of children. The percentages of unused pain medications, expired, and those with no clear expiration date were 20%, 14.9% and 12.9% respectively. Estimated pain medication wastage in the 415 households and in the whole Nablus district was 4,000 USD and 384,000 USD respectively. The most common pain medications encountered in households were: acetaminophen (42%), ibuprofen (24%) and diclofenac (18%). **Conclusion**: Pain medications were frequently encountered in Palestinian households, and relatively large percentage was being wasted. Keeping a limited stock of pain medication may avoid overuse of more expensive health services and might thus be cost-saving as well.

Key words: Storage, Cost, Pain Medications, Household, Palestine

1. Introduction

The occupied Palestinian territory consists of the West Bank, including East Jerusalem, and the Gaza Strip, and has a population of 3·77 million, 1·8 million of whom are registered refugees [1]. In Palestine, there are four main providers for health care: a Palestinian Ministry of Health (MOH), Palestinian non-governmental organizations, the United Nations Relief and Works Agency, and the private sector [2]. Health services are financed through a mixture of taxes, health insurance premiums and co-payments, out-of-pocket payments, local community financial and in-kind donations, and loans and grants from the international community. Reviews of the health sector estimated that total health expenditure in 2002 was 8·6% of gross domestic product (GDP) and per-person expenditure was $135 in 2005 [3]. Due to these reasons, the Palestinian MOH is trying to reduce unnecessary expenditures including those pertaining to consumption of medications in general.

Pain medications, are one of the most commonly used and prescribed medications. There are different types of pain medications. However, they are generally classified into opioid and non-opioid categories. The non-opioids include acetaminophen, aspirin and non-steroidal anti-inflammatory drugs (NSAIDs). Pain medications do not usually represent a serious medical risk when used appropriately in healthy subjects. However, they are not considered innocent in terms of safety and tolerability especially when used for self medication in patients with certain types of health problems [4-6] or among elderly patients. Actually, misuse of certain types of pain medications, such as mild opioid analgesics, could lead, in some cases, to addiction [7] or even unwanted harm. For example, a study in Palestine has shown that medication in general and pain medication in particular were the most common cause of suicidal and accidental poisoning [8].

The pharmacy practice in Palestine is far from ideal [9 - 12]. The ability of the public to obtain any type of pain medications without prescription is common. Such practices and the inadequate supervision are the main reasons to suspect pain medication misuse in Palestine. On the demand side, patients desire fast relief of their symptoms and they are more inclined to take pain medication as soon as they start developing minor aches. On the supply side, pain medications are available through community pharmacies with limited restrictions. Additionally, the economic constraints may affect health seeking behavior among Palestinians due to the cost of medical examination and consultation. Therefore, it is a common practice among many people to keep different types of pain medications at home for future use. Such practices impose health risks and economic loss both at the individual and national levels. Therefore, the objective of this study was to explore the extent of storage and to estimate the cost of national wastage of pain medications.

2. Methodology

2.1. Study population

This is a descriptive cross-sectional study of the characteristics of in-home storage and wastage of pain medications in Nablus district, northern part of Palestine. An extensive literature search using MEDLINE retrieved no articles related to drug storage and wastage in households in Palestine. The study took place during January and

February 2009 as part of the assigned pharmacy research course for the final-year students of the Faculty of Pharmacy at An-Najah University, Palestine. Approval of research ethics committee was obtained before the initiation of the study. For the purpose of this study, pain medications were defined as those listed under the N02A, N02B, M01B and M01C categories of the Anatomical Therapeutic Chemical (ATC) Classification System. These categories include: Analgesics (opioids and other analgesics and antipyretics) and Non-steroidal anti-inflammatory drugs alone or in combination.

2.2. Study tool: the questionnaire

A 3-page questionnaire was developed for this study. The questionnaire was administered by the students who were thoroughly introduced to the project and clearly instructed about where, how and when to collect data effectively. The questionnaire was administered through personal interview settings. Before the start of the project and collection of the data, the questionnaire was pilot-tested during October and November 2008 in more than 50 households. Based on the preliminary results generated through the pilot study, the questionnaire was modified and finalized. In addition, the questionnaire was subjected to a manual validity check and good reliability was established by calculation of the Cronbach alpha index of randomly selected variables. The study was designed to include at least 1% of the households in Nablus district (~ 40,000 household). Households to be included in the study were each students' own family household and four of their closest neighbors, if found. Exclusion criteria included families that were not willing to cooperate. Students were asked to inspect and to conduct an interview with the household member present at the time of interview. On the basis of the inspection and interview, the student was supposed to make an inventory of the found drug products and complete a questionnaire with 22 questions of varied format: checklist, open and closed-ended questions. The first section of the questionnaire included questions about: 1) age of the interviewee, 2) education of the father and mother, 3) total family members and their ages, 4) presence of any type of medical insurance, 5) presence of any healthcare provider in the house-hold, 6) place of residence and income, 7) presence of any family member with a chronic disease, and 9) total number of stored drugs including pain medications. The second section included: 1) correct knowledge of drug use, 2) source of the drug, 3) utilization pattern of the stored drugs, and 5) whether the drug was obtained by a prescription or not. The third section of the questionnaire was filled by the student and the researcher and included: 1) therapeutic class and dosage form of stored drugs, 2) retail cost, 3) expiration date, 4) number of drugs stored in original packaging, and finally 5) characteristics of drug keeping. The students requested the interviewee to guide them to different storage places of the drug products in the house to fill the questionnaire correctly and completely. In this study, each drug was considered as a separate product. For example, acetaminophen elixir and acetaminophen tablets were considered different products and were counted as 2 pain medications. In this study, real medication wastage was defined as any product that had expired or had no clear expiration date or not being used at all.

2.3. Data Analysis

Responses to each question were coded individually, and data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16 for windows (SPSS

Inc., Chicago, Illinois). Parametric and non parametric statistical tests were used when appropriate. The analysis included frequencies of discrete variables and descriptive statistics (mean ± SD) for continuous variables. Association between categorical variables was carried out using Chi-square (X^2) test. Independent sample's t test was used to compare means for groups. Spearman Rho test was used to assess correlation whenever appropriate. A p value less than 0.05 was considered significant throughout the analysis. For each house-hold, stored drug products were classified according to the Anatomical Therapeutic Chemical (ATC) code.

3. Results

A total of 465 household units (families) were surveyed and interviewed. Fifty families were excluded from the study because of lack of cooperation with the researchers. The final sample was 415 households, giving a response rate of 89%. The total number of drug products present in the 415 house-holds was 5505 with an average of 13.3 ± 7.8 per house-hold. Of the 415 families surveyed, 92.8% had pain medications available at home. The total quantity of analgesic products found in the 415 households was 1103, constituting approximately 20% of the total stored medications. The average number of analgesics per household was 2.7 ± 1.8. The amount and type of pain medications present are shown in Table 1 and 3. The 1103 pain medications stored belonged to a total of 29 different types of analgesics. The majority (584; 53%) of pain medications belonged to non-steroidal anti-inflammatory drugs (NSAIDs) while the remaining 519 (47%) belonged to other types of pain medications with opioids constituting 41/519 (8%) of this group. The most commonly encountered individual pain medications were acetaminophen (466; 42.2%) followed by ibuprofen (268; 24.3%) and diclofenac (199; 18%).

The demographic and socioeconomic characteristic of families having less than one pain medication versus those with multiple ones (≥ 2) were analyzed (Table 2). No significant relationship was found between number of pain medications stored in households and variables like presence of elderly (> 65 years), presence of children (< 6 years), insurance coverage, family size, total number of other stored medications, presence of family members with chronic diseases and presence of health care provider in the family. On the other hand, there was a weak, but significant and negative correlation between the number of pain medications stored and level of education of the father ($r = -0.1$; $P = 0.04$).

Of the 1103 pain medications found, 435 (39.4%) were stored in pharmacy cabinets, 230 (20.8%) in the refrigerator and 438 (39.7%) in other places around the house (kitchen and bedrooms) (Table 2). Approximately two thirds (712; 64.6%) of the pain medications were in their original container while 391 (35.4%) were not. When the interviewees were asked about the frequency of use for the stored pain medications, the answers were as follows: 882 (80%) were used regularly, often, or of unknown frequency of use while 221 (20%) were never used. When the interviewees were asked about the therapeutic uses of pain medications with permission to consult with other family members or the leaflet, 1033 (93.66%) of the answers were correct while 70 (6.34%) were incorrect. The most common dosage forms of stored pain medications were tablets 743 (67.4%) followed by oral liquid dosage forms 143 (13%), and 136 suppositories

(12.3%). Approximately 662 (40%) of the stored pain medications were initiated by self therapy while 441 (60%) were initially dispensed based on physician prescription or pharmacist advice.

After inspection, 165 (14.9%) of the stored pain medications were expired while 796 (72.2%) were not expired and 142 (12.9%) had no clear expiration date. Approximately 41.6% (69/165) and 31.5% (52/165) of the expired pain medications were never used and were not in their original container respectively. Furthermore, 42 (25.5%) of the expired pain medications were stored in places around the house like bed rooms, bathroom and kitchen. The total cost of the 1103 pain medications was ~ 9,550 USD, an average of 23 USD worth of pain medication per household. Drug wastage defined as the sum of expired; no clear expiration date and never used analgesics mount to 41.2% with a total cost of 4,000 USD, an average of 9.6 USD per household.

4. Discussion

Our study was an attempt to investigate and clarify in-home storage and wastage of pain medication in a sample of 415 Palestinian households in Palestine. In the households studied, pain medications constituted 20% of the total stored medication. This is higher than that reported in Belgium (15.5%) and Sudan (11.4%), lesser than that reported in Thailand (26%) and close to that reported in Saudi Arabia (~20%) [13 – 16]. Differences in the results reported from previous countries might reflect different health seeking habits and attitudes toward pain medications among different nations. The relatively high percentage of stored pain medications in Palestinian households was expected. A study carried out in Palestine by Sawalha et al showed that pain medications was the second most common type of medications (35%) dispensed by prescriptions in community pharmacies [17]. Another study about self medications in Palestine indicated that pain medications (30%) were the most common type of medications dispensed for self therapy [11].

In this study, the number of pain medication stored was not significantly associated with most of the tested variables. However, higher level of father education was associated with lower number of stored pain medications. It is possible that illiterate people tend to have lower rate of drug compliance leading to lesser consumption of medications and higher number of pain medications at home. On the other hand, it is possible that educated people have lesser tendency to self medicate with pain medications based on their knowledge of potential harm of such medications and thus keep less of such pain medications. In this study, 39.7% of the total pain medications were stored outside the pharmacy cabinet and refrigerator in accessible places to children and demented people. These storage conditions could be considered unsafe.

In our study, approximately one in seven pain medications (14.9%) had passed the expiration date while 12.9% had no clear expiration date. Aside from reduced activity, reports about expired drugs causing harmful effects are rare except for tetracycline [18]. Approximately 40% of pain medications were self initiated while 60% were dispensed according to the physician or pharmacist advice. We expect that this piece of result might be skewed because interviewees might have given us scientifically and socially desirable responses regarding self therapy. It is hoped that in real life, family members would initiate self therapy with pain medications stored at home after consulting with other family members and/ or the package leaflet.

The results obtained here can be used to estimate the national wastage of pain medications from households. In our study, the total cost of pain medications stored per households was 23 USD, a total of ~ one million USD given that there are 40,000 households in Nablus district. In this study the total cost of drug wastage per household was 9.6 USD. This would suggest that the total cost of pain medications wasted was 384,000 USD.

Our results showed that acetaminophen was the most common individual pain medication stored was acetaminophen followed by ibuprofen and diclofenac. This was expected given that there are more than 15 different brand names of acetaminophen marketed in Palestine as an OTC medication with very affordable prices compared to other pain medications. Furthermore, acetaminophen has less harmful effects on gastrointestinal tract compared to NSAIDs when given at therapeutic doses. However, accidental and suicidal poisoning cases with acetaminophen are not uncommon and can be fatal due to sever hepatic failure. Banned analgesics such as dipyrone were found in Palestinian households. Dipyrone is still marketed and dispensed in community pharmacies in Palestine. In many parts of the world, dipyrone is considered a dangerous drug and is no longer used. Serious adverse effects, often leading to fatalities, were observed and confirmed more than 60 years ago [19, 20]. The Palestinian ministry of health needs to revise the registration status of dipyrone for analgesic use based on current literature data. Furthermore, prescribers need to be aware of toxic effects of dipyrone.

Our study has strengths and limitations. The relatively large sample and home visits with personal interviewee are considered points of strength to this study. Since the interviewees were fully aware of the purpose of the project, they may have skewed the results by cleaning their houses from a lot of unused or expired pain medications. Another national study need to be carried out to better estimate household drug wastage and pattern of inappropriate drug storage and self use. In conclusion, keeping a limited stock of pain medication, for short-term and rational use, may avoid overuse of more expensive health services (e.g. emergency visits) and might thus be cost-saving as well.

Table 1. Number of pain medication by number of households.

Number of different pain medications stored	**Number of households (n = 415)**	**%**
0	31	7.4
1	89	21.4
2	100	24.1
3	81	19.5
4	58	14.0
≥ 5	56	13.6
Total	415	100

Table 2. Variables associated with multiple pain medication storage

Variable	**Households with ≤ 1 pain medication**	**Households with ≥ 2 pain medication**	***P***
Family size	6.3 ± 2.1	6 ± 2.6	0.23
Chronic disease Yes No	 49 (40.8%) 71 (59.2%)	 123 (41.7%) 172 (58.3%)	 0.9
Children < 6 years Yes No	 48 (40%) 72 (60%)	 127 (43.1%) 168 (56.9%)	 0.6
Elderly > 65 years Yes No	 15 (12.5%) 105 (87.5%)	 57 (19.3%) 238 (80.7%)	 0.1
Health care provider Yes No	 22 (18.3%) 98 (81.7%)	 46 (15.6%) 249 (84.4%)	 0.5
Insurance Yes No	 86 (71.7%) 34 (28.3%)	 185 (62.7%) 110 (37.3%)	 0.1
Total number of stored medications	12.3 ± 5.9	13.7 ± 8.4	0.09

Table 3. Types of pain medications encountered in households.

No	Name of the medication	ATC code	Frequency	%
1	Acetaminophen (Paracetamol)	N02BE01	466.0	42.25
2	Ibuprofen	M01AE01	268.0	24.30
3	Diclofenac	M01AB05	199.0	18.04
4	Indomethacin	M01AB01	30.0	2.72
5	Dextropropoxyphen, combinations excluding psycholeptics	N02AC54	23.0	2.08
6	Celecoxib	M01AH01	15.0	1.36
7	Naproxen	M01AE02	15.0	1.36
8	Tramadol	N02AX02	14.0	1.27
9	Etoricoxib	M01AH05	12.0	1.08
10	Meloxicam	M01AC06	10.0	0.90
11	Etodolac	M01AB08	9.0	0.81
12	lornoxicam	M01AC05	7.0	0.63
13	Dipyrone	-	5.0	0.45
14	Nimesulide	M01AX17	5.0	0.45
15	Paracetamol, combination	N02BE51	3.0	0.27
16	Acetylsalicylic acid, combinations	N02BA51	3.0	0.27
17	Diflunisal	N02BA11	2.0	0.18
18	Dextroprpoxyphen	N02AC04	2.0	0.18
19	Tometin	M01AB03	2.0	0.18
20	Mefenamic acid	M01AG01	2.0	0.18
21	Ketoprofen	M01AE03	2.0	0.18

22	Sulindac	M01AB02	2.0	0.18
23	Ergotamin, combination	N02CA72	1.0	0.09
24	Other analgesics and antipyretics	N02B601	1.0	0.09
25	Codeine, combination	N02AA59	1.0	0.09
26	Oxycodon, combination	N02AA55	1.0	0.09
27	Nabumetone	M01AX01	1.0	0.09
28	Ibuprofen combination	M01AE51	1.0	0.09
29	Piroxicam	M01AC01	1.0	0.09

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