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Retrospective study on antibiotic prescription patterns in Libyan community pharmacies of Zawia

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Abstract: Out-patient drugs are dispensed through community pharmacies. Drug utilization studies should be periodically performed in order to facilitate therapeutic efficacy and cost effectiveness, decrease adverse effects and provide feedback to prescribers to promote rational use of drugs. This study is a retrospective one which compares drug utilization and drug product cost of different antibiotics in 15 community pharmacies in Zawia, Libya. The study period was three months (January - March 2009). A total number of 512 prescriptions were studied of which, 57% were of male patients. The most frequently prescribed antibiotic (37 occurrences) was amoxicillin. The antibiotic with the highest total treatment cost (LD 551.25) was amoxicillin plus clavulanic acid while penicillin V was the antibiotic with the lowest total cost (LD 3.25). The highest mean cost was LD 52.00 for levofloxacin per patient. The most frequently prescribed route of administration was oral route (73%) and the least was parenteral route (6%). Average treatment period was rounded and found to be five days. In conclusion, the present data indicated an overuse of amoxicillin, in contrast to other antibiotics at least in Zawia, Libya. In the light of growing concerns over antibiotic resistance, the prescribers should consider equally pharmacologically effective and more cost effective antibiotics based on rationale approach. National drug utilization policy will facilitate to achieve these challenges towards achieving rational drug use.

Keywords: Drug utilization research, prescription patterns, community pharmacy, Libya

Introduction

Antibiotics are the most frequently prescribed group of drugs. Hence, programs that are designed to encourage appropriate antibiotic prescriptions in health institutions represent an important element in quality of care, infection control and cost containment. Drug utilization research aims to assess whether drug therapy is rational or not. To reach this objective, methods for auditing drug therapy towards rationality are necessary. Drug utilization research can be divided into descriptive and analytical studies. The emphasis of the former has been to describe patterns of drug utilization and to identify problems deserving more detailed studies. Analytical studies try to link data on drug utilization to figures on morbidity, outcome of treatment and quality of care, with the ultimate goal to assess whether drug therapy is rational or not. Drug

utilization research also provides insight into the efficiency of drug use, i.e. whether a certain drug therapy provides value for money. The results of such research are used to help to set priorities for the rational allocation of health care budgets (1, 2). The boost in the marketing of new drugs, the wide variations in the pattern of drug prescribing and consumption, the growing concern about the delayed adverse effects, and the increasing concerns regarding the cost of drugs, as reflected in the increase of both the sales and the volume of prescriptions. All contributed to the increasing importance of drug utilization studies (3). Additionally, the cost of medicines is a matter of great concern in developing and industrialized countries (4, 5). Long-term studies based on cost are also difficult due to fluctuations in currency exchange rates and changes in costs or pricing. When cost data are used, an increase in the use of lower cost drugs may have little influence on the total level of expenditure on drugs, while a shift to more expensive drugs is more readily noticed. Therefore, short-term cross sectional studies are recommended where cost is the criteria for evaluation (6). Previously, we have earlier studied on antibiotic prescription patterns in inpatient wards of various clinical departments (7).

Literature survey indicates numerous studies on out-patient prescription patterns in community based out-patients and pharmacies of various countries and their designs have evolved with time (8 - 17). There are no studies found in literature about drug utilization patterns and cost analysis of antibiotic use in out-patients of Libya. Therefore, the aim of the present research was to evaluate drug utilization of antibiotics, based on prescription patterns in community pharmacies of Zawia city, Libya. The objectives of the study were first to evaluate the use of antibiotics for out-patients, second to obtain information about the most common dosage forms used for out-patients and third to find out the cost and expenditures of different classes of antibiotics.

Materials and methods

A cross-sectional retrospective drug utilization study was conducted in 15 community pharmacies in Zawia, Libya. Data was collected retrospectively from random prescriptions of out-patients using specially designed data collection form. The form was sent to community (private) pharmacies to record the required information on the use of antibiotics. The data collection form was prepared by three pharmacy specialized academics. Then they were completed by the targeted community pharmacists with the assistance of researchers. All the pharmacies were chosen from the urban area of the city. Each prescribed antibiotic was recorded for demographic data, dosage form, indications, brands prescribed, cost of therapy, and route of administration, dose frequency and duration of administration. The medication cost was calculated in terms of Libyan Dinar (LD), as per the government pricing. Inclusion criteria of prescriptions were those containing brand, generic or both as available. Exclusion criteria of this study were prescriptions of hospital pharmacies

and medical centre pharmacies, prescriptions containing drugs those should not be prescribed generically as the release characteristic require the patient to be maintained on the same product, such as modified release dosage forms. The study period was three months (January - March, 2009) and the total number of prescriptions was 516. The collected data was fed into Microsoft Excel software for analysis and descriptive statistics.

Results

The data in Table 1 show the frequency of each prescribed antibiotic in each month for males and females. These also show the total cost and the average price of each prescribed antibiotic during the whole period of study. Of 516 prescriptions studied, 57% belonged to males, whereas 43% were those of females. During the three months study, the top selling three antibiotics were found to be Amoxicillin + Clavulanic acid (LD 551.25), Ciprofloxacin (LD 380.25) and Amoxicillin (LD 370.5). The total expenditure of antibiotic use during the study period was LD 2,838.00. The antibiotic with the highest average cost was found to be Levofloxacin (LD 52.00), while the one with the lowest average cost was Ampicillin with LD 1.00 (Figure 1). For some antibiotics, there was a wide range in cost. This is due to the variety of strengths, dosage forms, generic products and the quantity dispensed. The three most frequently prescribed antibiotics were Amoxicillin (21.5%), Amoxicillin plus Clavulanic acid (11.05%) and Ciprofloxacin (9.30%) of total prescribed antibiotics.

Table 2 shows the most widely used dosage forms in antibiotic prescribing for out-patients. The most frequently prescribed dosage forms were oral formulations such as tablets, capsules and syrups with 73.3% of total prescriptions. The other three most frequently prescribed dosage forms were topical ointments and powders (12.8%), eye and ear drops (8.1%) and parenteral dosage forms (5.8%) (Figure 2). The percentage of antibiotic multiple therapy was 13.3%. The top three prescribed brands were found to be Amoxil®, Glaxo Smith Kline, U.K. (amoxicillin), Augmentin®, Glaxo Smith Kline, U.K. (amoxicillin + clavulinic acid) and Ampilox®, Syria (ampicillin + cloxacillin). The commonly prescribed brands of antibiotics in Zawia are summarized in Table 3. Among the countries those supply medicines, the U.K. stands first with largest supply of antibiotics in Zawia, Libya.

Table 1: Prescribing frequencies and cost of antibiotics

Antibiotic	January		February		March		Total Cost (LD)	Total prescriptions (%)
	M	F	M	F	M	F		
Amoxicillin	18	15	27	12	30	9	370.5	111 (21.51)
Ampicillin	-	6	-	-	6	3	15	15 (2.91)
Ampicillin+Cloxacillin	-	3	6	-	12	-	33	21 (4.07)
Amoxicillin+Clavulanic acid	-	9	9	18	15	6	551.25	57 (11.05)
Azithromycin	3	-	-	6	-	-	118.5	9 (1.74)
Bacitracin+Neomycin	-	-	3	-	9	-	21	12 (2.33)
Cefalexin	-	3	-	3	-	-	16.5	6 (1.16)
Cefixime	-	6	6	3	6	-	304.5	21 (4.07)
Ceftriaxone	-	-	3	-	6	3	38.25	12 (2.33)
Cefuroxime	3	-	-	-	3	6	99	12 (2.33)
Chloramphenicol	-	-	12	-	6	3	66	21 (4.07)
Ciprofloxacin	3	6	9	3	21	6	380.25	48 (9.30)
Clarithromycin	3	-	3	-	3	-	70.5	9 (1.74)
Clindamycin	3	-	-	-	-	3	60	6 (1.16)
Co-trimoxazole	-	3	-	-	3	6	40.5	12 (2.33)
Doxycycline	3	-	3	-	-	3	37.5	9 (1.74)
Erythromycin	-	6	6	-	3	-	63	15 (2.91)
Flucloxacillin	-	3	-	-	3	-	45	6 (1.16)
Fusidic acid	-	-	-	3	6	6	46.5	15 (2.91)
Gentamicin	3	-	6	6	-	6	39	21 (4.07)
Levofloxacin	-	-	-	-	-	3	156	3 (0.58)
Metronidazole	-	-	6	3	3	3	45	15 (2.91)
Neomycin	-	3	-	-	-	6	24	9 (1.74)
Oxytetracycline	-	-	-	-	-	3	7.5	3 (0.58)
Penicillin V	-	-	-	-	-	3	9	3 (0.58)
Procain penicillin	-	-	6	6	-	3	67.5	15 (2.91)
Rovamycin	-	-	-	3	-	-	24	3 (0.58)
Tetracycline	3	-	-	-	6	6	26.25	15 (2.91)
Tobramycin	6	-	6	-	-	-	63	12 (2.33)
Total	**48**	**63**	**111**	**66**	**141**	**87**	**2838**	**516 (100)**

M = male; F = female; LD = Libyan Dinar; SD = standard deviation.

Table 2: Dosage forms of antibiotics

Dosage form	n (%)	Major therapeutic agent	n (%)
Parentral I.V & I.M	30 (5.8)	Procain penicillin	15
		Ceftriaxone	12
		Amoxicillin + Clavulanic acid	3
Oral Tablets, capsules & syrups	378 (73.3)	Amoxicillin	111
		Co-trimoxazole	12
		Flucloxacillin	6
		Cefixime	21
		Clarithromycin	9
		Ampicillin	15
		Doxacycline	9
		Amoxicillin + Clavulanic acid	54
		Ciprofloxacin	42
		Erythromycin	15
		Azithromycin	9
		Cefuroxime	12
		Ampicillin + Cloxacillin	21
		Clindamycin	6
		Metronidazole	15
		Cefalexin	6
		Rovamycin	3
		Levofloxacin	3
		Tetracycline	6
		Penicillin V	3
Drops Ear & eye	42 (8.1)	Neomycin	6
		Tobramycin	6
		Gentamicin	12
		Chloramphenicol	9
		Fusidic acid	3
		Ciprofloxacin	6
Topical ointments & powders	66 (12.8)	Tetracycline	9
		Tobramycin	6
		Gentamicin	9
		Chloramphenicol	12
		Bacitracin + Neomycin	9
		Fusidic acid	15
		Oxytetracycline	3
		Neomycin	3

n: number of prescriptions

Table 3: Common prescribed brands of antibiotics and their distribution

Generic name	Brand name	Country of origin	Number of Prescriptions
Amoxicillin	Remox	K.S.A	3
	Saifoxyl	Tunisia	6
	Penamox	Jordan	12
	Neomox	U.A.E	6
	Amoxicillin	U.K	9
	Aramox	Egypt	3
	Amoxil	U.K	72
Ampicillin	Ampicillin	India	15
Ampicillin + Cloxacillin	Ampilox	Syria	21
Amoxicillin + Clavulanic acid	Augmentin	U.K	30
	Neo-Clav	U.A.E	3
	Megamox	K.S.A	6
	Amoclan	Jordan	18
Azithromycin	Zomax	Jordan	9
Bacitracin + Neomycin	Baneocin	Egypt	12
Cefalexin	Midaflex	Jordan	3
	Ceprorex	Egypt	3
Cefixime	Suprax	Jordan	21
Ceftriaxone	Rocephine	India	12
Cefuroxime	Enfexia	Turkey	12
Chloramphenicol	Isoptophenicol	Belgium	3
	Chloramphenicol	Jordan	9
	Chloramphenicol	Egypt	3
	Chloramphenicol	Switzerland	3
	Coriphenol	Switzerland	3
Ciprofloxaicn	Neo- Cipro	U.A.E	6
	Bactiflox	Switzerland	15
	Cipromid	Jordan	3
	Siprox	U.K	6
	Enfexin	Turkey	3
	Ciprofloxacin	Cyprus	6
	Tyflox	India	3
	Ciloxan	Belgium	6
Clarithromycin	Resclar	U.A.E	6
	Clarthromycin	U.K	3
Clindamycine	Dalacin	Belgium	6
Co-trimoxazole	Bactrim	Egypt	6
	Septrin	Egypt	18
Doxycyline	Vibramycine	Tunisia	9
Erythromycin	Erythromycin	Italy	6
	Rythinate	Jordan	6
	Ermysel	Portugal	3
Flucloxacillin	Flucloxacillin	Netherland	3
	Flumax	Egypt	3
Fusidic acid	Fucidin	Denmark	15
Gentamicin	Gentamicin	Egypt	6

	Apigen	Jordan	15
Levofloxacillin	Tavacin	France	3
Metronidazole	Flagyl	Tunisia	15
Neomycin	Maxidrol	Tunisia	6
	Polydexa	Tunisia	3
Oxytetracyline	Sterdex	France	3
Pencillin V	Ospen	Tunisia	3
Procain Penicillin	Procain Penicillin	Egypt	9
	Procain Penicillin	Turkey	6
Rovamycin	Rovamycin	Tunisia	3
Tetracycline	Apicycline	India	6
	Tetracycline	India	6
	Opticycline	Jordan	3
Tobramycin	Tobradex	Belgium	12

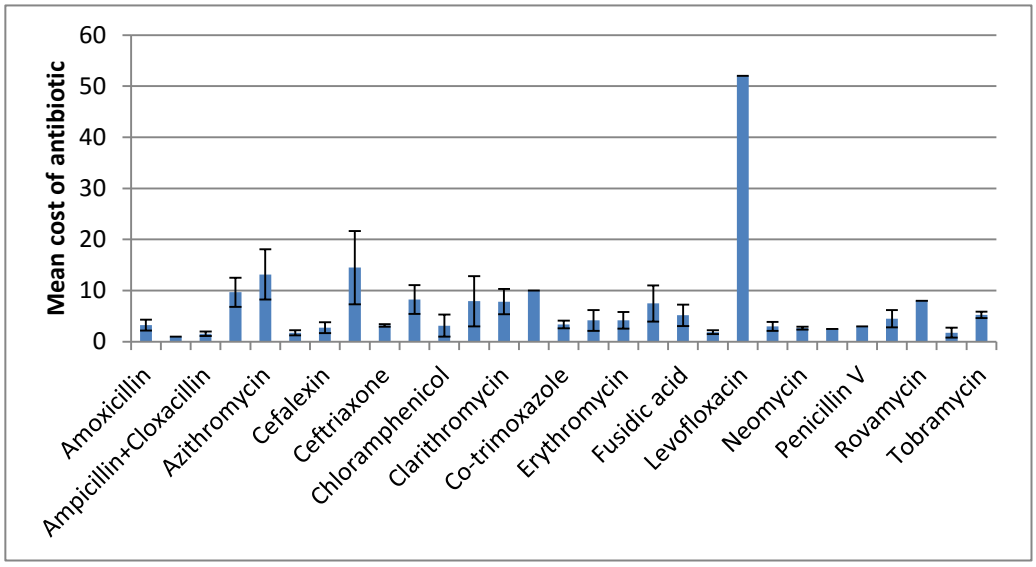

Figure 1: Mean cost (Libyan Dinars) of prescribed antibiotics

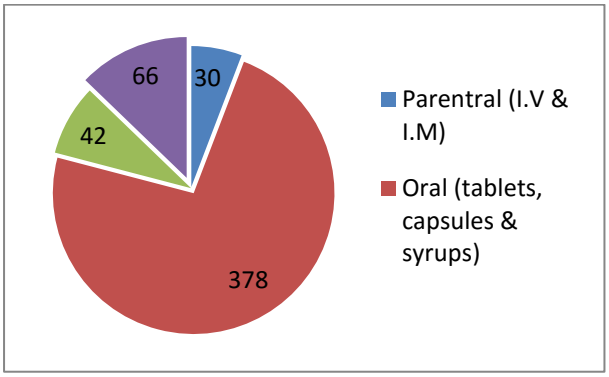

Figure 2: Dosage form distribution of antibiotics

Discussion

This cross-sectional retrospective study has compared the drug utilization and drug product cost of different antibiotics in several community pharmacies in Zawia, Libya. During the 3-month study period, a total number of 516 prescriptions were studied from 15 community pharmacies. Male prescriptions were 14% greater than those of females on usage of antibiotics. The most frequently prescribed antibiotic was amoxicillin with 111 times, indicates that it was the common choice of prescribed medication opted by physicians across the city. The reason could be due to its safety profile and first choice of antibiotic. The least opted antibiotics were penicillin V, levofloxacin, oxytetracycline and rovamycin with 3 times each only. Cost-wise, the top 3 highest selling antibiotics were amoxicillin plus clavulanic acid, ciprofloxacin and amoxicillin with LD 551.25, 380.25 and 370.50 respectively, indicating that cost of antibiotics was superseded by their clinical superiority and safety. Penicillin V was the antibiotic with the lowest total cost with LD 9 that administered by parenteral route. The highest mean cost was found to be LD 52 for levofloxacin. Oral administration of antibiotics was dominant, with 73% whereas the parenteral route was least preferred, with only 6% of all prescriptions. The average treatment period was found to be 5 days for most of antibiotics. Cost of treatment plays an important role in market economics and patient compliance. Activities of marketing and promotion activities might have influenced the prescribing practices (18). The total expenditure of antibiotic use during the study period was LD 2,838.00 and the mean cost per patient was LD 7.03 (±1.62) which indicates affordability relative to the per capita income of Libya. The antibiotic with the highest average cost was found to be levofloxacin, with LD 156.00 due to its high cost where as the one with the lowest average cost was ampicillin with LD 3.00. Amoxicillin remained as the most frequently prescribed antibiotic, followed by amoxicillin plus clavulanic acid and ciprofloxacin being popular antibiotics. The percentage of antibiotic multiple therapy was 13.3%. Prescribers in Zawia were found to be most relied on UK based brands such as Amoxil (amoxicillin) and Augmentin (ampicillin + cloxacillin) with largest supply followed by Syrian brand Ampilox.

Thus, data showed higher use of amoxicillin, in contrast to other antibiotics for out-patients. High therapeutic effectiveness against most local and systemic infections, low incidence of side effects, high safety, low cost and availability of many suitable dosage forms with different strengths was thought to be the reason that prescribers tended to prefer this over other antibiotics. A microbiological investigation before therapy is need. This also helps physicians to have a more precise understanding on prescriptive patterns prevalent in the community. In the light of growing concerns over antibiotic resistance, the prescribers should be considered equally pharmacologically effective and more cost effective antibiotics based on rational approach. National drug utilization policy will facilitate to achieve these challenges towards achieving rational drug usage.

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