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The practice and knowledge among community pharmacists about dispensing antibiotics in Egypt; a cross-sectional study

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ABSTRACT

Background: Antibiotics dispensing without prescription is a common practice in some countries causing several health-related issues such as microbial resistance. **Aim:** This study aims to assess the level of practices and knowledge among community pharmacists about antibiotic dispensing in some Egyptian governorates' pharmacies. **Methods:** A cross-sectional study was carried out using an online questionnaire to different 5 Egyptian governorates during a period from 28th January to 3rd March 2024. **Results:** A total of 117 community pharmacists from different community pharmacies participated in the study from different Egyptian governorates with the majority (44.4%) from Cairo. A majority (73.5%) were readily aware that dispensing antibiotics without a prescription is legal in Egypt. Additionally, 94% indicated that dispensing antibiotics without a prescription is a common practice in community pharmacies in Egypt, the most common class (59%) of antibiotics dispensed without a prescription was penicillin, followed by cephalosporins with 44.4%, about 69.2% of community pharmacists occasionally provide antibiotics without a prescription when requested by a patient. Additionally, 60.7% suggest over-the-counter drugs for patients showing infection symptoms without needing antibiotics, and approximately 84.6% inquire about patients' allergy history before giving out antibiotics without a prescription. **Conclusion:** The level of knowledge among community pharmacists is high referring to some practices related to antibiotic dispensing with most responses revealing that dispensing antibiotics without a prescription is legal in Egypt.

Introduction

Antibiotic resistance has been labelled a worldwide health crisis by the World Health Organization (WHO) causing several health damages and issues [1]. The global prevalence of antibiotic resistance [2], particularly in developing countries such as Egypt [3], has been extensively documented with its hazardous consequences in

people's lives and general health and those resistant organisms are linked to both hospital and community acquired illness [4, 5]. The patterns of resistance that emerge at the regional level in these countries may eventually become universal to find that the microorganisms in the gastrointestinal, urinary tract and respiratory systems that were once easily treated with antibiotics are now becoming resistant to several antibiotic classes [6]. High

morbidity and mortality rates have been linked to infections caused by multidrug-resistant (MDR) bacteria [7, 8]. Antibiotic resistance is becoming more of a threat as a result of the COVID-19 pandemic's increased prevalence of multidrug-resistant bacterial infections [9]. These highly resistant bacterial strains are a serious public health concern because they undermine efforts to stop the spread of infectious diseases that are linked to higher rates of morbidity, death, and financial burden [10]. Furthermore, pharmaceutical corporations find it extremely expensive to spend on the development of new antibiotics due to the low budgets for the investment involved in creating more effective antibiotics [11]. This reduces the possibilities for treating these extremely resistant strains when they arise, especially in environments with limited resources [7, 8, 12]. Over and inappropriate use or incorrect administration of antibiotics can be the reason for the development of antibiotic resistance [3], antibiotics are sometimes used in the wrong way, like when people take them by themselves or get them without a prescription, which happens a lot in poor and some of developing countries [13]. The issue is significantly influenced by the common habit of buying antibiotics without a prescription from pharmacies in different places globally [14-16]. Many countries have the existence of regulatory measures that impose restrictions on the availability of antibiotics, as documented such as Caracas, Spain, Bangladesh, Greece, and Syria [17, 18] to prevent antibiotics from dispensing without prescriptions and affirm not to sell or dispensed them as over-the-counter medicines. In Egypt, these regulations are not strictly enforced by regulatory agencies [19, 20] and the dispensing of antibiotics as over-the-counter medicines has been widely reported in Egypt [21-23]. A review of many studies showed that 62% of antibiotics are given out without a prescription in community pharmacies [24]. Antibiotics are available over-the-counter and are typically used to treat milder forms of sickness that do not require prolonged antibiotic treatment, such as the common cold and diarrhea [24]. So, this study aimed to assess the level of practices as well as knowledge among community pharmacists about antibiotic dispensing in some Egyptian governorates' pharmacies.

Subjects and Methods

Study Design

A quantitative cross-sectional study was done using a self-administrated online questionnaire distributed to several community pharmacists for a period between August 2023 and October 2023.

Settings

The present study was conducted within main five regions: Cairo, Alexandria, Minya, Asyut and Sohag regions in Egypt. Those governorates have the majority of community pharmacies in Egypt with a great opportunity to find antibiotics dispensing without regulations. The selection of these governorates varies from governorates with less knowledge among the population and the capital of a country with the largest number of pharmacies.

Population and sample:

The present study employed a convenience technique to select community pharmacists. In 2023, the Egyptian Pharmacists Syndicate (EPS) reported a total of 95,000 community pharmacies. Those EPS figures also reveal that the rounded number of registered pharmacists reached 313,000 in 2023 [25].

Sample size:

Based on the Richard Geiger equation, the margin of error is set at 5% and the confidence level is established at 95%. The population under investigation exhibits a response distribution giving the estimated sample size of community pharmacists to participate in this study with 117 community pharmacists as referenced from Sabry et al. study [26].

Questionnaire design and description

The questionnaire was designed by experienced pharmacists with high knowledge of antibiotics and community pharmacy dispensing roles and adapted with the help of several previous studies [21, 24]. This study questionnaire is composed of three parts, Part I: the demographic data of the participants, Part II: knowledge of antibiotics dispensing regulation's part and it consists of 7 items, the first 5 items are measuring the knowledge of dispensing with 3-likert scale. Part III: practice regarding dispensing antibiotics without prescription part and it consists of 19 items and the first 8 items and items from 14 to 19 are measured using 3-likert scale.

The final form of the questionnaire was in English form and a pilot study was conducted at first on 20 community pharmacists from different Egyptian governorates to assure that the questionnaire's items are valid. Internal consistency among questionnaire items and Cronbach alpha was also measured, which was 0.81 to assure the questionnaire's reliability. This questionnaire is comprised of 21 items divided into 7 related to knowledge and 14 for practices, in addition to the community pharmacist's demographic data.

Data collection procedure

The distribution of the questionnaire was carried out online by distribution to all social media applications such as Facebook, WhatsApp, and Telegram to make a high coverage of distributions to the selected governorates, in addition only Cairo was used for convenience because it is the capital of the country. Personal consent was presented on the first page of an online questionnaire showing pharmacists the aim of the study and its implications for preserving all their data. The data was collected and extracted into an Excel sheet.

Data Analysis Techniques

A Statistical Package for Social Sciences (SPSS), to analyze the collected data and test the research hypotheses and some descriptive statistical tests were used to describe the demographic data, knowledge, and practices of these pharmacists, while the independent Samples Test and ANOVA were used to describe the practices and knowledge correlations to community pharmacists' demographic variables.

Ethical Consideration

IRB approval was obtained from the faculty of pharmacy at Ain Shams University with the number 255 and this study was independently carried out by the authors. Approval was obtained from all participating community pharmacists on the first page of the questionnaire informing them that by completing this online questionnaire, they would accept to participate in this study.

Results

Community pharmacists' demographics

From a total of 117 community pharmacists from different community pharmacies participated in the study, more than half (50.4%) were male and, most of them (36.8%) were aged between 26 to 30 years old. From different governorates, the majority (44.4%) were from Cairo, while the least (1.7%) governorate was

Asyut. Their experience in community pharmacies varied to reveal that the majority (53%) have experience from 1 to 5 years, about the education level, the majority (65.8%) had bachelor's degree and only 6% have a PhD degree (**Table 1, Figure 1**).

Knowledge degree among participants

The normality test results showed the knowledge data wasn't normally distributed according to Kolmogorov-Smirnova and Shapiro-Wilk ($P < 0.001$). However, according to the Central Limit Theorem, if the sample size is large ($n > 30$) the data is considered approximately normally distributed (**Table 2**).

The study revealed that 79% of individuals in Egypt had a moderate to somewhat high level of awareness of the proper usage of distributing antibiotics in community pharmacies, 73.5% of the participants were aware that giving antibiotics without a prescription is permissible in Egypt. Moreover, 94% of respondents stated that providing antibiotics without a prescription is prevalent in community pharmacies in Egypt, with 90.6% acknowledging that this behavior leads to the inappropriate use of antibiotics. Additionally, 94.9% said that providing antibiotics without a prescription contributed to the development of germ resistance. 96.6% of respondents viewed antibiotic resistance as a significant public health concern.

About 68.4% of participants agreed that antibiotics are unnecessary for diarrhea without any specific reasons, whereas 36.5% stated that Oral co-trimoxazole should be given for upper respiratory tract infections (URTIs) without any specific reasons. Additionally, 32.5% of participants thought that antibiotics were unnecessary in some circumstances (**Table 3**).

The practice and attitude of pharmacists

Approximately 48.7% of community pharmacists dispense antibiotics without a prescription less than 5 times a day, 41% do so from 5 to 10 times a day, and only 10.3% more than 10 times a day. The majority (69.2%) sometimes dispense antibiotics without a prescription upon a patient's request, 22.2% always do so, and 8.5% never do. The majority (60.7%) sometimes recommend and dispense antibiotics without a prescription based on a patient's complaint. 31.6% consistently, and 7.7% never, approximately 55.6% of participants dispensed antibiotics without a prescription for 3 to 5 days as the maximum

duration, while 42.7% did so for 6 to 7 days. Around 47.9% dispensed antibiotics without a prescription for 1 to 3 days as the minimum duration, and 47% did so for 4 to 7 days. Approximately 55.6% of participants did not dispense antibiotics for patients with symptoms of an infection that did not require antibiotics. 26.5% dispense, with the majority being 76.1%. Patients showing signs of infection should be referred to a physician. 60.7% suggest over the counter/self-care treatment for patients with infection symptoms not requiring antibiotics. 84.6% inquire about patients' allergy history before giving antibiotics without a prescription. 78.6% inform patients about potential antibiotic side effects when given without a prescription. 82.9% guide managing the side effects of antibiotics given without a prescription. 90.6% recommend patients see their physician if symptoms persist. 88.9% advise patients to complete the prescribed antibiotic dose. 76.1% counsel patients on the health risks of self-medication (**Table 4**).

Factors influencing pharmacists to dispense antibiotics

The most common reasons for dispensing antibiotics without a prescription were: patient inability to afford consultation fees (40.2%), lack of awareness about the prohibition of over-the-counter sales of antibiotics (31.6%), patient's previous experience (29.9%), patient attempting to obtain antibiotics from another pharmacy, pharmacist's confidence in knowledge of antibiotic therapy (28.2%), fear of losing clients/patients (19.7%), inaccessible healthcare facility (18.8%), long waiting time for consultation (15.4%), and financial gains (13.7%) (**Table 5**).

The diseases and dosage forms that are remedied by antibiotics and can be obtained without a prescription.

The most class of antibiotics dispensed without prescription was penicillin (59%), followed by cephalosporins with 44.4%, and the least dispensed one was Carbapenems (0.9%) (**Figure 2**). Also, it was noted that the majority of pharmacists (90.6%) are commonly dispensing antibiotics without prescription for adults, and only 0.9% of them are dispensing for geriatrics (**Figure 3**). Regarding the antibiotic dosage forms, the most widely dosage form dispensed without prescription was Oral (76.9%), followed by Topical (56.4%), while the parenteral are the least ones (13.7%) (**Figure 4**). It was observed that the illness that

mostly needed the pharmacists to dispense antibiotics without a prescription for it was Wounds (56.4%), followed by Urinary tract infections and Cold and flu (48.7%), while Malaria was the least disease that needed an antibiotic dispensing without prescription (2.6%) (**Figure 5**).

Factors affecting the knowledge level of these community pharmacists

The study found a significant difference in knowledge level based on job area ($F= 2.314$, $P\text{-value} = 0.048$) and experience ($F= 5.733$, $P\text{-value} = 0.001$), whereas no significant difference was seen based on gender, age, and education.

There was a correlation between antibiotic dispensing practices and gender, with a higher number of females observed giving this advice compared to males. The study found a strong correlation between pharmacists providing advice to patients about the health consequences of self-medication and the patient's age ($\chi^2 = 16.133$, $P\text{-value} = 0.041$). Individuals between the ages of 26 and 30 were noted to offer this counsel more often than other age groups.

There was a notable correlation between the length of therapy for antibiotics given without a prescription (longest duration in days) and age ($\chi^2 = 6.532$, $P\text{-value} = 0.038$). Pharmacists between the ages of 26 and 30 were more likely to distribute medications for periods of 6 to 7 days compared to other age groups in this study.

There was a strong correlation between the frequency of dispensing antibiotics without a prescription in a day and the work area ($\chi^2 = 23.542$, $P\text{-value} = 0.009$). Cairo had the highest percentage of dispensing antibiotics without a prescription less than 5 times a day, followed by Minya. Pharmacists in Cairo were also noted to dispense shorter durations (ranging from 1 to 3) more frequently than pharmacists in other governorates (**Table 6**).

The multiple regression was conducted and the predictors were entered into the model by a stepwise method to exclude insignificant predictors, the results indicated a significant effect of the predictors (Age from 26 to 30, Bachelor education, and Cairo work area) on the knowledge level ($F= 4.799$, $P=0.003$), and the variation in the knowledge level due to these predictors was 11.3% ($R^2= 0.113$). Pharmacists aged from 26 to 30 have a higher knowledge level by 0.080 ($P= 0.006$), who were holding bachelor by 0.064 ($P= 0.029$), and were working in Cairo by 0.054 ($P= 0.046$).

Table 1. The demographic characteristics among community pharmacists in this study (n=117)

Variables	Frequency (n)	Percentage %
Age (Years)		
20 - 25	35	29.9
26 - 30	43	36.8
31 - 35	19	16.2
36 - 40	10	8.5
More than 40	10	8.5
Community Pharmacist's Working area		
Cairo	52	44.4
Alexandria	14	12
Minya	25	21.4
Asyut	2	1.7
Sohag	6	5.1
Other	18	15.4
Years of experience at community pharmacies (Years)		
1 - 5	62	53
6 - 10	31	26.5
11 - 15	9	7.7
More than 15	15	12.8
Educational level		
Bachelor	77	65.8
Diploma	19	16.2
Master	14	12
PhD	7	6

Table 2. Results of the normality test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	d f	P-value	Statistic	d f	P-value
Knowledge	0.228	117	< 0.001	0.896	117	< 0.001

Table 3. The degree of knowledge about antibiotic dispensing regulations among the community pharmacists who participated in this study (n=117)

Variables	n	%	% corrected answer
Antibiotics can be legally dispensed without a prescription in Egypt			73.5
Yes*	86	73.5	
No	27	23.1	
I don't know	4	3.4	
Antibiotics are frequently given out without a prescription at community pharmacies in Egypt			94
Yes*	110	94	
No	6	5.1	
I don't know	1	0.9	
Purchasing antibiotics without a prescription leads to the improper utilization of antibiotics.			90.6
Yes*	106	90.6	
No	5	4.3	
I don't know	6	5.1	
The antibiotics dispensing without a prescription promotes the development of germ resistance			94.9
Yes*	111	94.9	
No	4	3.4	
I don't know	2	1.7	
Antibiotic resistance is a public health issue			96.6
Yes*	113	96.6	

No	2	1.7	68.4
I don't know	2	1.7	
Clinical case 1 (Recognize diarrhea that does not require antibiotic treatment)			
Oral amoxicillin	13	11.1	
Oral co-trimoxazole	11	9.4	
Oral amoxicillin-clavulanic	13	11.1	32.5
No antibiotic treatment, only oral rehydration*	80	68.4	
Clinical case 2 (Identify upper respiratory tract infection (URTI) without the need for antibiotic treatment)			
Oral amoxicillin	10	8.5	
Oral co-trimoxazole	43	36.8	
Oral amoxicillin-clavulanic	26	22.2	79
No antibiotic*	38	32.5	
Total			

The practice and attitude of pharmacists

Table 4. The level of practice regarding dispensing antibiotics without prescription

Items	n	%
Frequency of giving antibiotics without a prescription per day		
Less than 5	57	48.7
5 – 10	48	41
More than 10	12	10.3
Antibiotics dispensing without a prescription upon the patient's request		
Never	10	8.5
Sometimes	81	69.2
Always	26	22.2
Prescribe antibiotics without a prescription based on the patient's complaint.		
Never	9	7.7
Sometimes	71	60.7
Always	37	31.6
Highest duration of treatment for over-the-counter antibiotics		
1 – 2	2	1.7
3 – 5	65	55.6
6 – 7	50	42.7
8 and above	0	0
Lowest duration of treatment for over-the-counter antibiotics		
Less than a day	3	2.6
1 – 3	56	47.9
4 – 7	55	47
More than 7	3	2.6
Referring patients to a physician when they present with symptoms of infection		
Yes	89	76.1
No	5	4.3
May be	23	19.7
Recommend over-the-counter medication for patients exhibiting symptoms of an infection without the need for an antibiotic.		
Yes	71	60.7
No	18	15.4
May be	28	23.9
Before providing antibiotics without a prescription, inquire about the individual's allergy history.		
Yes	99	84.6
No	6	5.1
May be	12	10.3
Inform patients of possible adverse effects of over-the-counter antibiotics.		

Yes	92	78.6
No	7	6
May be	18	15.4
Inform patients about how to manage the side effects of antibiotics obtained without a prescription.		
Yes	97	82.9
No	6	5.1
May be	14	12
Instruct patients to finish the prescribed course of antibiotics.		
Yes	104	88.9
No	5	4.3
May be	8	6.8
Inform patients about the health consequences of self-medicating		
Yes	89	76.1
No	11	9.4
May be	17	14.5

Table 5. The reasons noted for dispensing antibiotics without a prescription.

No	Reasons	N	%
1	Awareness lacking about the over-the-counter prohibition sales of antibiotics	37	31.6
2	Fear of losing clients/patients	23	19.7
3	The patient tries to obtain antibiotics from another pharmacy	33	28.2
4	Patients cannot afford consultation fees	47	40.2
5	Inaccessible healthcare facility	22	18.8
6	Long waiting time for consultation	18	15.4
7	Patient's previous experience	35	29.9
8	Financial gains	16	13.7
9	Pharmacists' confidence in the knowledge of antibiotic therapy	33	28.2
	Total	264	225.6

Table 6. The factors affecting the knowledge level among the community pharmacists in this study (n=117)

No	Variables	Categories	Frequency (n)	Statistics (F)	P-value
1	Gender	Male	76	-1.905	0.059
		Female	81		
2	Age	20 - 25 years	78	1.516	0.202
		26 - 30 years	83		
		31 - 35 years	77		
		36 - 40 years	74		
		More than 40 years	73		
3	Work area	Cairo	82	2.314	0.048*
		Alexandria	71		
		Minya	82		
		Asyut	64		
		Sohag	69		
		Other	76		
4	Experience	1 to 5 years	79	5.733	0.001*
		6 to 10 years	84		
		11 to 15 years	65		
		More than 15 years	71		
5	Education	Bachelor	80	1.806	0.150
		Diploma	79		
		Master	76		
		PhD	67		

*Significant at $\alpha = 0.05$

Table 6. Factors affecting the knowledge level

R^2	F	P	Predictors	β	t	P
0.113	4.799	0.003	Age from 26 to 30	0.080	2.808	0.006
			Bachelor	0.064	2.213	0.029
			Cairo	0.054	2.021	0.046

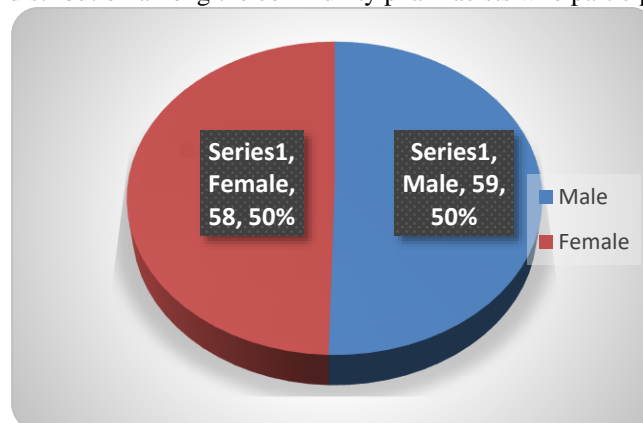
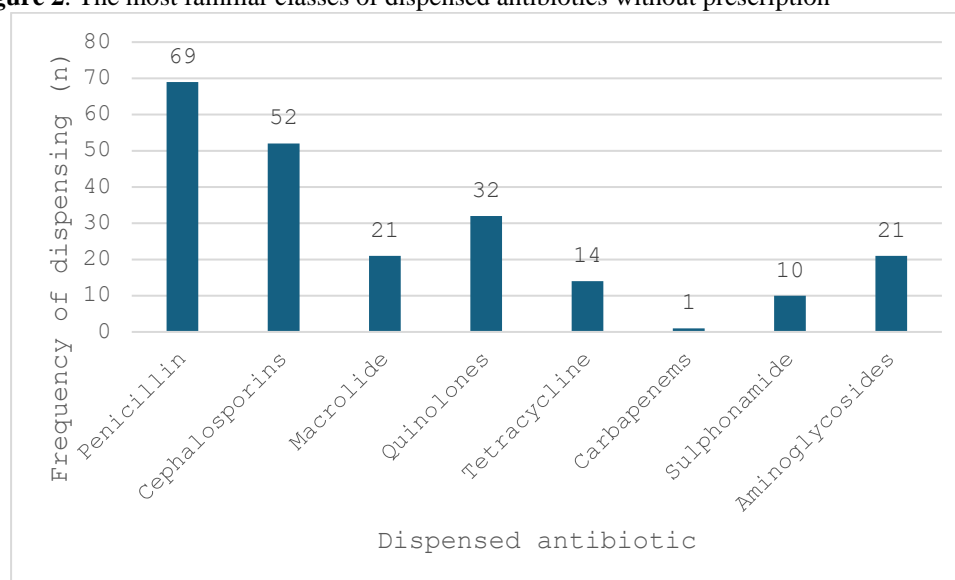
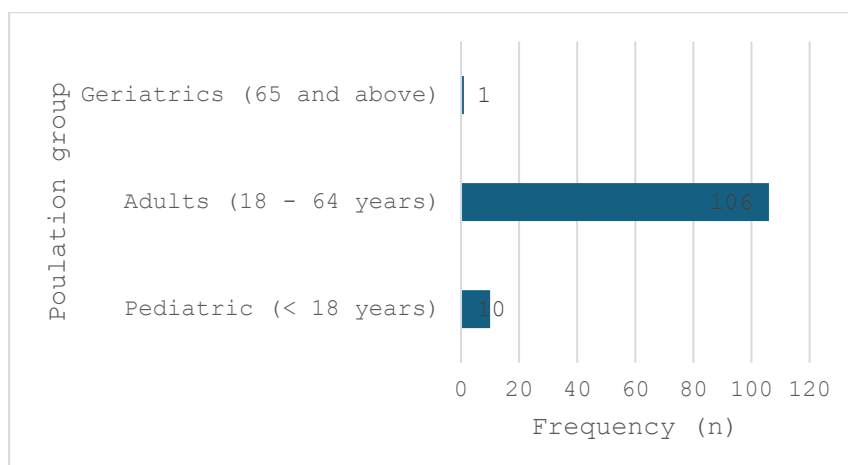
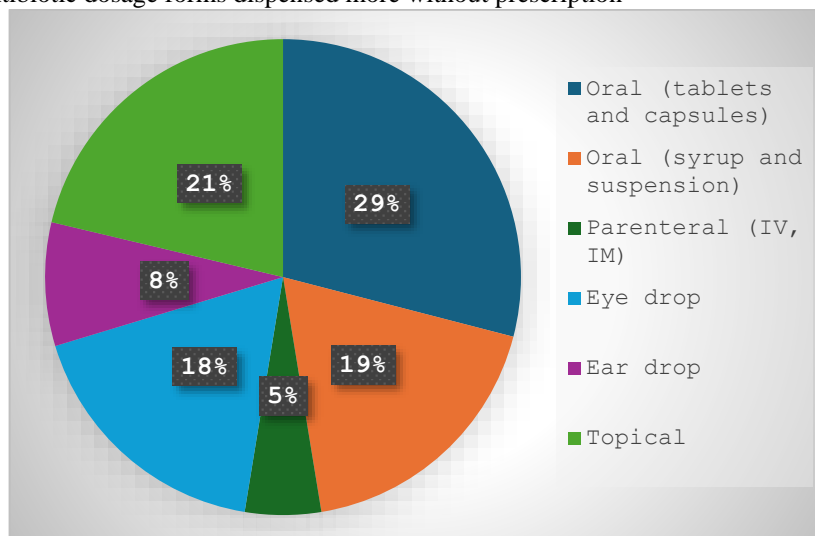
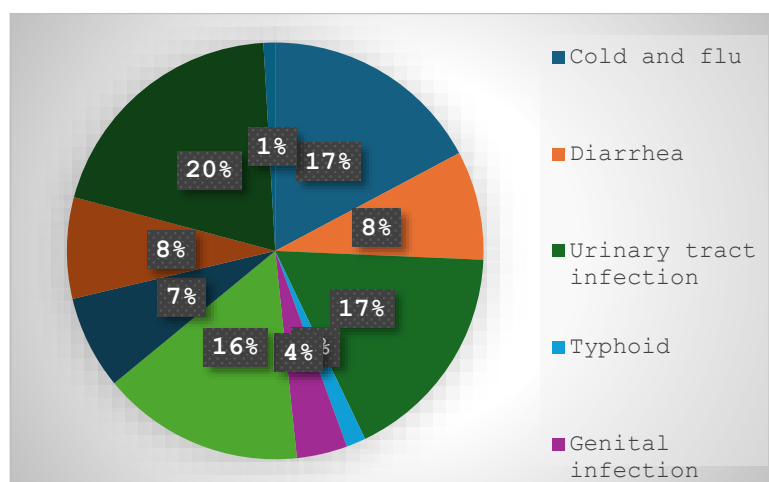
Figure 1. The gender distribution among the community pharmacists who participated in this study (n=117)**Figure 2.** The most familiar classes of dispensed antibiotics without prescription**Figure 3.** The most common population group pharmacists commonly dispense antibiotics without prescription

Figure 4. The antibiotic dosage forms dispensed more without prescription**Figure 5.** The most popular illnesses for which antibiotics were dispensed without a prescription for them

Discussion

This study aims to assess the knowledge and level of practices among community pharmacists about antibiotic dispensing in some Egyptian governorates' pharmacies. In this study, a total of 117 community pharmacists from different governorates were asked to assess their knowledge and practices towards antibiotics dispensing, Cairo was the highest area in the participation because it is the largest governorate and the capital of Egypt with the largest number of community pharmacies and population [25].

The degree of knowledge among these community pharmacists was relatively high towards the antibiotics use and indications, this was also reported in previous reports carried out in Egypt by **Abdelaziz et al.** and **Zakaa El-din et al.**, and in Sudan by **Abdelrahman Hussain et al.** [27-29].

A majority of pharmacists indicated that dispensing antibiotics without a prescription is a common practice in community pharmacies in Egypt as it is legal in Egypt with lacking law enforcement, and it is also giving the rationale why there are a large proportion of dispensing antibiotics in Egypt with emergence of several consequences, which was also reported in studies carried out in Cairo by **Zakaa El-din et al.** and in Alexandria by **Kotb and ElBagoury**) [28, 30] in addition to a study conducted in Lebanon by **Kakati et al.** [31], as well, those pharmacists are dispensing antibiotics without a prescription less than 5 times a day which is considered as high rate of dispensing in this country as reported by WHO [1] and sometimes they are dispensing antibiotics without a prescription upon a patient's request, which is in alignment with **Torres et al.**, who reported that the non-prescribed antibiotic dispensing is influenced by patient demand, patient expectations and attitudes about

antibiotics, and physician prescribing procedures [32] and with **Sabry et al.** also found that around 61% of antibiotics were dispensed based on pharmacist suggestion and patient's request [26].

Most of these pharmacists believed that dispensing practice contributes to the inappropriate use of antibiotics too, this is in contrast to **Kakati et al.** study, which reported that most pharmacists approved of prescribing antibiotics without a prescription, deeming it appropriate with high knowledge of dispensing these antibiotics [31]. Also, pharmacists have a great knowledge that dispensing antibiotics without a prescription contributes to the emergence of microbial resistance, which is considered a public health issue, and is considered the main reason for antibiotic resistance locally and worldwide as reported by **Al-Halawa et al.** and **Kumar et al.** [33, 34]. Most pharmacists advise patients to take antibiotics with a duration of 6 days, which agrees with **Shet et al.** study, which reported that the most common time course for antibiotics dispensing is 5 days [35].

The majority of pharmacists refer patients to a physician when they present with symptoms of an infection, which is in contrast to **Ahmad et al.**, who reported that only 9.5% of pharmacists refused to dispense antibiotics and instead recommended a visit to a physician [36]. Most of these pharmacists ask patients about a history of allergies before dispensing antibiotics without a prescription and advise patients to complete the prescribed dose of antibiotics dispensed without a prescription, and agree with several studies carried out by **Bianco et al.** [37] while is in contrast to **Torres et al.**, **Ahmad et al.** and **Ndaki et al.** studies, who reported that the common antibiotic dispensing procedures without inquiring about the patient's medical and allergy history, without providing clear instructions on administration [32, 36, 38].

Antibiotics were often dispensed without a prescription due to reasons such as financial constraints preventing a doctor's visit, ignorance of the ban on over-the-counter antibiotic sales, past experiences with antibiotics, seeking antibiotics from a different pharmacy, and the pharmacist's belief in their antibiotic treatment expertise, which is in agreement with **Kakati et al.**, who reported that antibiotics are dispensed and purchased without a prescription due to economical constraints and financial costs, convenience by patients to their

antibiotics chosen, and the pharmacists' competition to sell [31].

The class of antibiotics which is commonly dispensed without a prescription was penicillins followed by cephalosporins and they are common antibiotics for adults aged 18 to 64 years, which is in agreement with **Sabry et al.** study, which reported that antibiotics were mostly used for respiratory tract issues and symptoms of gastroenteritis and the most often prescribed antibiotics were penicillins and tetracycline [26]. The most common illnesses for which pharmacists dispense antibiotics without a prescription were wounds, followed by urinary tract infections, colds and flu, and eye infections, it is in alignment with **Abdelrahman Hussain et al.** study, who found that over half of the pharmacists had a high level of awareness and proficiency for treating tonsillitis (67%), wound infection (n = 766, 62.9%), and urinary tract infection (54%) [29].

There was a significant difference in knowledge level due to work area as pharmacists in Cairo and those who have experienced years more than 5 years have higher knowledge than other Egyptian governorates which is in agreement with **Abdelrahman Hussain et al.** study, who found that the majority of community pharmacists (61.7%), have a strong knowledge base, which is substantially correlated with their years of experience ($P < 0.00$) [29], but there is no significant difference between pharmacists' knowledge and gender, age, and education, which is in agreement with **Al-Taani et al.**, who reported from their investigation which was conducted to assess the influence of age and education on the overall knowledge score, the findings did not show statistical significance ($p = 0.070$) [39].

This study has a small sample size and did not cover all Egyptian governorates which may cause a certain degree of bias. The knowledge did not include the antibiotic interactions and main adverse events for most popular antibiotics. However, this study shed light on the importance of adding some regulations on antibiotic dispensing in Egypt with improving their knowledge by carrying out more training courses and educative sessions about antibiotic use, interactions, and adverse events.

Conclusion

It can be concluded that the knowledge level regarding the convenient use of dispensing

antibiotics in several community pharmacies in Egypt was high with a slight need for more improvement, as well as their level of practices is high with their belief in controlling their antibiotics' dispensing to combat microbial resistance. There is a high percentage of antibiotic dispensing without prescription in some Egyptian governorates with long duration, this study reported also that most community pharmacists in Egypt counsel their patients and provide them with the appropriate information needed for antibiotic use and administration.

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