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Original Research

Assessing attitudes towards antibiotics use: Is it still a cause for concern? A mixed methods study

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Abstract

Background: Dispensing an antibiotic medication without a physician's prescription is a common issue in Saudi Arabia. Recent reforms were implemented to tackle the problem, including financial penalties and revocation of pharmacist licenses. This study aimed to assess the inappropriate use of antibiotics, identifying the most frequently used antibacterial medications and therapeutic indications. **Methods:** This is an exploratory sequential mixed methods study. **Results:** Nine interviews were conducted. The most frequently prescribed antibiotic medications were as follows: Fucicort® cream, Fusibact B® cream, Fusibact® cream, Fusiderm® cream, Anazol®, Augmentin®, Ciprocin®, Zimax®, Dexaflox®, Tobradex® and Tymer® ($p < 0.05$). Of the 329 participants, 44.6% (n = 147) indicated that they had misused antibiotic medications, almost half of which (40.7% [n = 60]) occurred within the past two years. Males were more likely to use antibiotics without prescriptions ($p < 0.05$). Thirty per cent of the sample (n = 82) purchased antibiotics without prescriptions. Two hundred participants (60.7%) reported purchasing at least one of the antibiotics mentioned above without prescriptions. Community pharmacy was the most frequent source for obtaining antibiotics without a physician's prescription (48%). **Discussion and Conclusion:** People are still using and purchasing antibacterial medications without prescriptions. This is paramount to decision makers, as the results showed noticeable non-compliance with the current policy regulating dispensing prescription medicines.

Keywords: factors; adverse events following immunization (AEFI); covid-19 vaccine; Thailand

INTRODUCTION

An antibacterial medication is a double-edged sword that may be used to save patients' lives and simultaneously put their lives at risk if it is not used appropriately. The inappropriate use of antibiotics may lead to antimicrobial resistance, which consequently affects the medication health outcomes and, unhappily, may lead to the emergence of new microorganisms. It has been defined as using antibacterial medications not prescribed by healthcare professionals to self-medicate.[1] This includes but is not limited to using leftover medications, receiving medicines from friends or family members or using antibiotics for other indications than what they have been prescribed for.[1] It is well known that inappropriate use of antibiotics could lead to failure of therapy and the development of antimicrobial resistance. The Centers for Disease Control and Prevention defines antimicrobial resistance as the ability of microorganisms, e.g. bacteria and fungi, to survive despite using medications designed to eradicate them; in other words, they do not respond to medications and continue to grow.[2] Although antimicrobial resistance may occur naturally, the misuse of antimicrobials might accelerate the process, leading to major threats at several levels.[3]

The inappropriate use of antibiotics significantly impacts global healthcare systems and the economy, making it one of the most vital health concerns encountered worldwide.[4] It has been reported that antibiotic resistance leads to not only a substantial increase in healthcare costs but also hospital length of stay, mortality and readmission.[5] The attributable costs of antibacterial-resistant infections ranged from $30,998 to $74,306 in hospital-onset invasive infections.[6] The number of deaths estimated due to antibiotic resistance was 4.95 million globally in 2019.[7] The number is expected to increase, reaching 10 million death incidences annually by 2050.[8,9]

Given that the developed countries are experiencing woes of antibacterial resistance resulting from antibiotic misuse, the situation is worse in the developing ones. In Saudi Arabia, several studies showed that people received antibiotics without prescriptions, ranging from 37% to 79%.[10-12] It had been a commonly seen practice until the health authorities recently enforced new laws/policies to regulate the dispensing of antibiotics.[13] Presently, dispensing an antibiotic without a prescription is against the law.[13,14] The disciplinary actions range from financial penalties to revocation of a pharmacist's license and being tried in court.[14,15,16] The health authorities conducted several mass national campaigns to raise people's awareness and enforce the laws in community settings to encounter the issue.[15,16] The campaigns had wide resonance and were meant to tackle the issue. Nevertheless, in a study that aimed to assess the pattern of antibiotic use before and after law enforcement, the authors found that the new enforcement decreased receiving antibiotics without prescriptions by 2%.[17] However, in another study conducted among community pharmacies, there was a huge reduction in dispensing antibiotics without prescriptions (70.7% vs 12.9%).[18]

Taking that into consideration, the assessment of dispensing antibiotics without prescriptions may provide a better

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understanding if it is conducted from the patient's perspective, as they are more likely to report what they have experienced. In addition to that, the antibiotic medications are sold in different formulations (e.g. cream or eye drops), which might not be well known as 'antibiotics' in the general public. Therefore, identifying the most frequently prescribed antibiotics (creams, tablets, etc.) and assessing the problem from the public perspective may provide a better insight into the problem.

The aims of the study

This exploratory study aimed to identify the most frequently prescribed antibacterial medications, the major health conditions reported for self-medication and the pattern of using these medications without prescriptions among the general public.

MATERIALS AND METHODS

Study design

This is an exploratory sequential mixed methods study in which the author started with interviews, followed by designing a quantitative data collection tool, an 'online questionnaire'.

Ethical approval

The study was approved by the Ethics Committee at King Faisal University (Ref. no. KFU-REC-2022-SEP–ETHICS174).

Setting and sampling

The interviews were conducted at community pharmacies. Pharmacies were selected based on the types of business (i.e. chain community pharmacies, independent community pharmacies and healthcare-centre-related community pharmacies). The online survey was distributed widely via social media platforms (e.g. WhatsApp and Twitter) to ensure the representation of the sample. All adults (18 years or above) living in Saudi Arabia and able to read in Arabic or English were eligible to participate in the survey.

Data collection tools

The data collection tool was designed to understand attitudes towards antibiotics in Saudi Arabia. First, interviews were conducted with pharmacists working for different community pharmacies. The primary goal of conducting these interviews was to identify the most frequent antibiotics prescribed to patients. The medications were as follows: Fucicort® cream (fusidic acid and betamethasone), Fusibact B® cream (fusidic acid and betamethasone), Fusibact® cream (fusidic acid), Fusiderm® cream (fusidic acid), Anazol® oral tablets (metronidazole), Augmentin® oral tablets (amoxicillin and clavulanic acid), Ciprocin® oral tablets (ciprofloxacin), Zimax® oral capsules (azithromycin), Dexaflox® eye drops (ofloxacin and dexamethasone), Tobradex® eye drops (tobramycin and dexamethasone) and Tymer® eye drops (gatifloxacin). The medications and their therapeutic indications were listed as checkbox questions, allowing participants to choose multiple responses if needed. Furthermore, a picture of each medication was provided so it could be identified easily. The survey comprised two main sections, both of which comprised closed-ended questions. Some questions had a 'short answer option', allowing participants to write their responses when needed. The first part comprised a set of demographic questions (e.g. age, gender and educational level). The second part was constructed to collect information about participants' attitudes towards antibiotic use (e.g. using antibiotics without prescriptions, names of antibiotics used, therapeutic indications or ways of obtaining the medications). The questionnaire was revised and tested to ensure its clarity and appropriateness and was available in Arabic and English.

Data collection

Ethical approval was obtained prior to disseminating the online survey. The qualitative data were noted on papers, allowing the researcher to analyse and revisit the data when required. Data were collected from 5 October 2022 to 12 December 2022. Two undergraduate students helped the author with data collection. The researcher, with the help of the two students, used Google Forms to create the survey, and the invitation was placed at the beginning of the questionnaire to highlight important information, such as the study aim, the length of the survey, eligible participants, participant confidentiality and privacy, and researcher's contact information.

Data analysis

Data were analysed using SPSS software (version 29.0). First, the author used descriptive statistics (e.g. measure of frequency, measure of central tendency and measure of dispersion) to describe the study's findings. All demographic variables except age and educational attainment (ordinal variables) were treated as nominal. Furthermore, the medication groups were treated as a nominal variable, whereas frequency of use (i.e. the number of participants who received a medication without a prescription) was treated as a continuous variable. A Chi-square test was used to assess the association between demographic variables and purchasing medicines without prescriptions. Additionally, a non-parametric test (Kruskal–Wallis test) was conducted to compare between groups (medications and frequency of use). The significance values, computed by the Kruskal–Wallis test, were adjusted by the Bonferroni correction for multiple tests. All statistical tests were conducted at a significance level of 5% ($p = 0.05$).

The qualitative data were analysed manually to identify the most frequently prescribed medications. A saturation point was reached at the ninth interview. Medications nominated three or more times were included in the study.

RESULTS

Participant characteristics

The total number of participants who completed the questionnaire was 329. Of those, 60.2% (n = 198) were females, and the majority of the sample (65.9%) were aged less than 40 years (mode = 22–29 years). Most participants (75.4%) received an additional qualification (mode = bachelor's degree or equivalent) after finishing general education (i.e. secondary school) and lived in the Eastern region (86.6%), Table 1.

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Table 1. Characteristics of the Study Group	
Participant characteristics	Study group n = 329 (%)
Gender	
Male	131 (39.8)
Female	198 (60.2)
Age	
18–21 years	37 (11.2)
22–29 years	97 (29.5)
30–39 years	83 (25.2)
40–49 years	53 (16.1)
50–59 years	45 (13.7)
60–64 years	13 (4.0)
+65 years	1 (0.3)
Nationality	
Saudi	323 (98.2)
Non-Saudi	6 (1.8)
Educational level	
No degree/level completed	2 (0.6)
General education (primary, intermediate or secondary school)	79 (24.0)
Diploma or equivalent	38 (11.6)
Bachelor's degree or equivalent	183 (55.6)
Master's degree or equivalent	20 (6.1)
Doctorate degree or equivalent	7 (2.1)
Geographic area	
Eastern region	285 (86.6)
Central region	28 (8.5)
Western region	2 (0.6)
Northern region	12 (3.6)
Southern region	2 (0.6)

Participants' attitudes towards antibiotic use

Nearly half of the sample (44.6% [n = 147]) indicated that they had misused antibiotic medications, and somewhat below half of these incidences (40.7% [n = 60]) occurred within the past two years (Table 2). Males were more likely to use antibiotics without prescriptions ($p < 0.05$), and no significant associations were observed between the level of education or age and the use of antibiotics without prescriptions. Healthcare facilities (e.g. pharmacy) were the most reported sources for obtaining antibiotics that were used improperly (44.8% [n = 66]), followed by antibiotics that were available at home from previous use (24.4% [n = 36]), Table 2. When participants were asked a direct question about buying antibiotics from community pharmacies without prescriptions, around 30% of the sample (n = 82) indicated that they had previously bought antibiotics without prescriptions (Table 2). Interestingly, the percentage of those who had misused antibiotics increased to 60.7% (n = 200) after asking about the most frequently prescribed antibiotics and showing their pictures. The medications were as follows: Fucicort® cream (fusidic acid and betamethasone), Fusibact B® cream (fusidic acid and betamethasone), Fusibact® cream (fusidic acid), Fusiderm® cream (fusidic acid), Anazol® oral tablets (metronidazole), Augmentin® oral tablets (amoxicillin and clavulanic acid), Ciprocin® oral tablets (ciprofloxacin), Zimax® oral capsules (azithromycin), Dexaflox® eye drops (ofloxacin and dexamethasone), Tobradex® eye drops (tobramycin and dexamethasone) and Tymer® eye drops (gatifloxacin). As mentioned previously, these medications were considered by community pharmacists the most commonly prescribed antibiotic medications (Figure 1). Of those 200 participants, 45% (n = 90) used antibiotics within the last two years; 48% (n = 96) and 26.5% (n = 53) bought antibiotics from retail community pharmacies and those attached to private hospitals, respectively (Table 2). A total of 102 participants (51%) of the 200 reported that they had used antibiotics without prescriptions because of an experience (the medication was prescribed to them previously), whereas 22.5% (n = 45) indicated that the medications had been recommended by community pharmacists, and the same percentage was observed for those who used the medications because of a recommendation/advice from a relative or a

Table 2. Participants' Attitudes Towards Antibiotic Use	
Participant attitudes	Study group N = 329 (%)
Have you ever used an antibiotic without a prescription?	
Yes	147 (44.6)
No	163 (49.5)
I cannot remember.	19 (5.7)
On that occasion, when did you use the antibiotic medication without a prescription?	
Within the last year	49 (33.3)
Within the last two years	11 (7.4)
Within the last five years	16 (10.8)
More than five years ago	32 (21.7)
I cannot remember.	39 (26.5)
On that occasion, from where did you get the antibiotic?	
From a medical or pharmacy facility	66 (44.8)
From a family member or friend	23 (15.6)
Via online shopping	2 (1.3)
The antibiotic was available at home from a previous use.	36 (24.4)
I cannot remember.	19 (12.9)
Other	1 (0.6)
Have you ever bought an antibiotic medication from a community pharmacy without a prescription?	
Yes	82 (24.9)
No	223 (67.8)
I cannot remember.	24 (7.3)

Have you ever bought/got one of these medications (i.e. Fucicort cream, Fusibact B cream, Fusibact cream, Fusiderm cream, Anazol, Augmentin, Ciprocin, Zimax, Dexaflox eye drops, Tobradex eye drops or Tymer eye drops) without a prescription?	
Yes	200 (60.7)
No	105 (31.9)
I cannot remember.	24 (7.3)
When did you get the medication without a prescription (i.e. a medication on the list)?	
Within the last year	55 (27.5)
Within the last two years	35 (17.5)
Within the last five years	29 (14.5)
More than five years ago	32 (16)
I cannot remember.	49 (24.5)
On that occasion, where did you get the medication (i.e. a medication on the list)?	
A pharmacy located at a private hospital	53 (26.5)
A pharmacy located at a government hospital	22 (11.0)
A community pharmacy (e.g. retail pharmacies on high streets)	96 (48.0)
A pharmacy located at a healthcare centre	7 (3.5)
I cannot remember.	22 (11.0)
On that occasion, why did you use the medication (i.e. a medication on the list) without a prescription?	
Because of a previous use of that medication (i.e. it was prescribed to me before)	102 (51.0)
Because of advice from a family member or friend	45 (22.5)
It was recommended by a pharmacist.	45 (22.5)
Other	8 (4.0)
Have you ever asked a pharmacist to give you an antibiotic without a prescription?	
Yes	146 (44.3)
No	153 (46.5)
I cannot remember.	30 (9.1)
On that occasion, how did the pharmacist deal with your request?	
The pharmacist refused to dispense the antibiotic without a prescription.	87 (59.5)
The pharmacist refused to dispense the antibiotic without giving a reason.	9 (6.1)
The pharmacist dispensed the antibiotic.	45 (30.8)
Other	5 (3.4)

friend (Table 2). Furthermore, the results showed that around half of the sample (44.3% [n = 146]) had asked community pharmacists to dispense an antibacterial medication without having a prescription. A third (n = 45) of those requests were fulfilled by pharmacists, whereas the majority of participants (65.5%) claimed that the pharmacists had refused to dispense the medications (Table 2).

Further analysis showed the most common antibacterial medications obtained without a physician's prescription and the diseases being self-medicated. Of the 11 listed medications, Fucicort® cream was the most frequent medication used without prescriptions (30.6% [n = 139]), followed by Fucibact B® cream (15% [n = 68]) and Tobradex® eye drops (12.3% [n = 56]), Figure 1. The total number of medications used without prescriptions was 454 (max = 139; min = 9; M = 41; SD = 38). There was a significant difference among medications ($p < 0.05$), and even when the significance values were adjusted for multiple tests, the pairwise comparison test showed that many medication groups were significantly different. Moreover, the participants indicated that they had used antibiotics to self-medicate various medical conditions. The total number of self-medicated incidences reported by participants across the 15 pre-listed medical conditions was 397 (max = 126; min = 1; M = 26; SD = 32). Of those, skin diseases and burns, eye inflammation and sore throat were the most reported conditions, accounting for 31.7% (n = 126), 16.8% (n = 67) and 10.3% (n = 41), respectively (Figure 2).

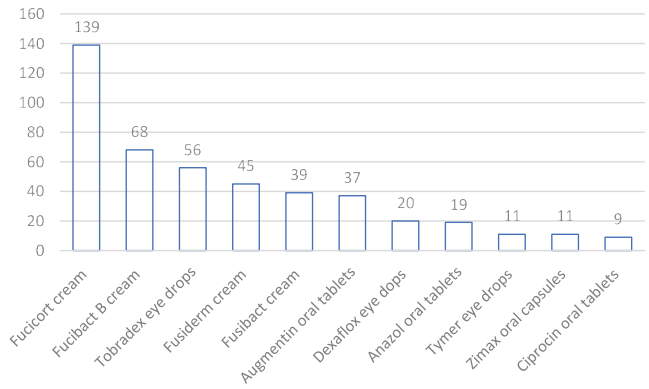

Figure 1. The most frequently prescribed antibiotic medications

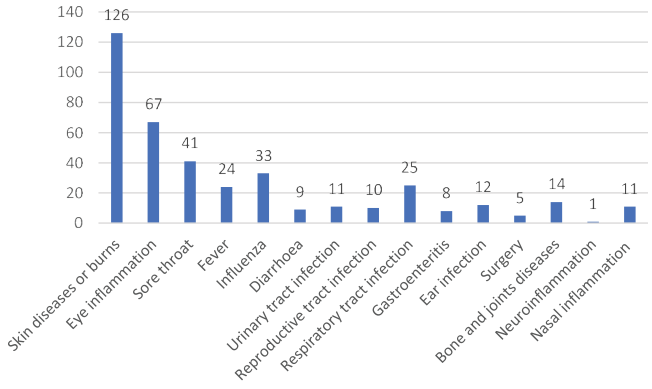

Figure 2. The major health conditions reported for self-medication

DISCUSSION

Dispensing a medication without a prescription is not allowed in Saudi Arabia.[13,14] However, people were used to obtaining these medications without prescriptions, especially antimicrobial medicines.[19] In the first half of 2018, Saudi health authorities started to tackle this issue by enforcing laws and raising people's awareness of using antibiotics without prescriptions.[15,16] Several studies were conducted to assess the prevalence of the problem, and most of these were done before the recent enforcement.[17-19] The prevalence of using antibacterial medications (44.6%) and purchasing antibiotics (25%) without prescriptions are still high despite the recent reforms. Interestingly, when participants were shown pictures of antibiotics and asked if they had purchased these medications, the percentage of those who had purchased antibiotics without prescriptions increased to 60.7%. This might be attributed to participants' knowledge and familiarity with antibiotic medications. Some creams, eye drops, etc., contain antimicrobial ingredients and should be recognised as 'antibiotics'. According to the results of the current study, it seems there are two main factors contributing to the problem. First, many community pharmacists are still dispensing antibiotics without prescriptions, giving the laws and regulations the cold shoulder. In a study published in 2016 (before law enforcement), 70.5% of community pharmacists were unaware of prohibiting dispensing antibiotics without prescriptions.[19] This is not the case currently, as pharmacists are well informed and have to post a sign inside the pharmacy indicating the prohibition of dispensing medications without prescriptions.[20] Other potential causes were pharmacy accessibility and convenience, simplicity of disease management, the expertise of pharmacists, misconceptions about antibiotics and generating more profits.[19,21,22] Second, the general public's awareness of antibacterial medications should be raised, especially for medications that might not be seen as 'antibiotics' from the public's viewpoint (e.g. creams or ointments containing antimicrobial ingredients). Addressing that issue may improve the health outcomes of medications, as antibiotics require stricter rules concerning therapy duration and timings. Furthermore, the results showed that the participants had used antibiotics for the wrong indications. However, this was beyond the scope of this study; it was obvious that many participants had used antibiotics to treat influenza. This stresses the need to raise public awareness about using antibacterial medications appropriately.

The results of the current study revealed that Fucicort® cream, Fucibact B® cream and Tobradex® eye drops were the most frequently used medications without prescriptions, whereas skin diseases and eye inflammation were the most reported medical conditions. Given the expertise of community pharmacists and ease of disease management for some medical conditions (e.g. sore throat and minor skin diseases), it would be better to involve community pharmacists more in providing healthcare services to patients. According to the laws that regulate the pharmacy profession, it is allowed to offer certain healthcare services inside the pharmacy (e.g. checking vital signs, vaccinations and treating some medical conditions, such as headache, ear pain, diarrhoea and myalgia) after meeting the requirements.[23] Extending the list to include other minor diseases and allowing pharmacists to prescribe medications for certain conditions are beneficial in terms of service accessibility, pharmacy profits, job satisfaction and reducing pressure on other healthcare providers. Pharmacists willing to provide advanced clinical services (e.g. minor ailment services) should be competent and qualified to offer the service. This can be guaranteed by designing additional medical programmes that prepare pharmacists to accept the new role.

Study limitations

Despite having enough to conduct inferential statistics, the sample collected might not represent the whole population, as the majority lived in a single geographic area. Given the nature of the study, the reported observations could be impacted by recall bias, in which data collected might not be accurately reported.

CONCLUSION

This study found a considerable percentage of people using and purchasing antibacterial medications without prescriptions. This issue is paramount to decision makers, as the results showed noticeable non-compliance with the current policy regulating dispensing prescribed medicines.

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Institutional Review Board Statement: The study was approved by the Ethics Committee at King Faisal University (Ref. no. KFU-REC-2022-SEP–ETHICS174).

Data Availability Statement: Data are available upon request from the corresponding author.

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CONFLICTS OF INTEREST: The author declares no conflict of interest.

CONTRIBUTION: The author confirm contribution to the paper as follows: study conception and design: MMA. Data collection: MMA, and the two students mentioned above (see acknowledgments); analysis and interpretation of results: MMA; draft manuscript preparation: MMA. The author reviewed the results and approved the final version of the manuscript. The author has critically reviewed and approved the final draft and is responsible for the content and similarity index of the manuscript.

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