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# Community pharmacists' knowledge, attitude, and practices towards dispensing antibiotics without prescription (DAwP): a cross-sectional survey in Makkah Province, Saudi Arabia

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SUMMARY

*Objectives:* To evaluate knowledge, attitude, and practices of community pharmacists towards dispensing antibiotics without prescription (DAwP) in Makkah Province, Saudi Arabia.
*Methods:* A cross-sectional survey was conducted between January and February 2016 using a structured, validated, and pilot-tested questionnaire. A four-step systematic approach was used to recruit community pharmacists who completed a 28-item questionnaire either in English or Arabic language based on their personal preference.
*Results:* Of the 200 community pharmacists approached, 189 completed the questionnaire. More than two-thirds (70.5%) of the pharmacists were not aware that DAwP is illegal practice. Lack of patient willingness to consult a physician for a non-serious infection (69.9%) and an inability to afford a consultation with a physician (65.3%) were the most common reasons cited for DAwP. A statistically significant association was found between the number of antibiotics dispensed and educating patients about the importance of adherence and completion of the full course of antibiotics ($p = 0.007$).
*Conclusions:* In general, community pharmacists have a poor understanding of the regulations prohibiting the over-the-counter sale of antibiotics in Saudi Arabia, explaining the high rate of DAwP in the country. A multifaceted approach consisting of educational interventions and improving the access to and affordability of healthcare facilities for the general public is required to effectively reduce DAwP and its negative consequences on public health.


## 1. Introduction

Almost one in six deaths worldwide are attributed to infectious diseases.[1] With only a handful of new antimicrobials in the developmental pipeline,[2] ever-growing antimicrobial resistance (AMR) perhaps poses the greatest threat to public health globally.[3] AMR is especially of serious concern in developing countries, because most of these countries, if not all, have no comprehensive national action plan to combat AMR.[4] According to the World Health Organization (WHO) report on AMR, only 33 out of 133 countries surveyed had a national action plan to combat AMR.[4] The irrational use of antibiotics, a multidimensional phenomenon encompassing unnecessary and suboptimal use of antibiotics (incorrect dose, duration, frequency, and indication), including the overuse of broad-spectrum antibiotics, is primarily responsible for the global spread of AMR.[5]

Dispensing antibiotics without prescription (DAwP) is a major contributing factor in the irrational use of antibiotics leading to the development of AMR.[6,7] The non-prescription use of antimicrobials has been associated with shorter courses and suboptimal drug and dose choices.[8–12] It has been estimated that more than 50% of the antibiotics worldwide are sold without a medical prescription (over-the-counter sales)[13] despite the fact that dispensing without a prescription is illegal in most of the countries. The phenomenon

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of DAwP is not only common in low-income countries, but is also common in the developed world. Studies from several European and South American countries, including Spain, Greece, Portugal, Mexico, and Brazil, have reported this malpractice.[14–18]

Although illegal,[19] dispensing without a prescription remains a serious problem in Saudi Arabia, as in many other countries in the Middle East such as Syria, Egypt, and Jordan.[20–22] A cross-sectional simulated patient study conducted in Riyadh, Saudi Arabia reported that 78% of surveyed community pharmacies (total $n = 327$) dispensed antibiotics without prescription.[23] The study authors concluded that antibiotics were not only dispensed without a prescription but also without an evidence-based indication. Another survey conducted in the coastal city of Jeddah, Saudi Arabia reported that almost all (98%; total $n = 60$) of the community pharmacies visited dispensed antibiotics without prescription.[24] The most common reason cited by the community pharmacists for this malpractice was fear of losing a customer, as the customer would have obtained antibiotics from any other neighbouring pharmacy.[24]

Saudi Arabia hosts the largest annual human mass gathering event, Hajj – the Muslim pilgrimage to Makkah.[25] It has been estimated that almost three million Muslims from more than180 countries visit Makkah each year for Hajj. The event lasts for 5 days, in and around the city of Makkah, but visitors usually stay for 10–40 days. In addition to Hajj, Makkah also hosts approximately 10 million pilgrims from all over the world throughout the year. Infectious diseases remain the most common cause of hospital admission and death among pilgrims after cardiovascular diseases.[26] Although the Saudi Ministry of Health provides free-of-charge treatment to all pilgrims, pilgrims often obtain antibiotics from local pharmacies, borrow from friends, family, and other pilgrims, and/or bring antibiotics from their own country for self-use. This irrational and non-prescription use of antibiotics associated with over-the-counter sales of antibiotics is not only harmful for pilgrims, but also has global public health implications in relation to the development and spread of AMR.

Despite the fact that community pharmacists have a central role in ensuring the safe use of antibiotics in the community, it appears that no study has evaluated the knowledge, attitude, and self-reported practices of community pharmacists towards DAwP in the Makkah region. To fulfil this research gap, the present study was conducted to evaluate the knowledge, attitude, and practices of community pharmacists towards DAwP.

## 2. Methods

A cross-sectional survey was conducted using an anonymous, structured, validated, and pilot-tested questionnaire among community pharmacists in the Makkah region, Saudi Arabia, between January and February 2016.

### 2.1. Ethical approval

Ethical approval was obtained from the Human Research Ethics Committee, College of Pharmacy, Umm Al-Qura University, Makkah, Saudi Arabia (Reference No. UQU-COP-EA # 143706). Participation in the study was voluntary.

### 2.2. Questionnaire design

A comprehensive literature search was performed of the electronic databases (MEDLINE and EMBASE), and relevant studies were reviewed with the aim of informing the design of the questionnaire for the present study.[14,16,17,21,24] The questionnaire was initially developed in the English language and the final version was translated into the Arabic language. The translation was validated using the standard forwards and backwards method. The face and content validity was performed by two academics with extensive experience in survey research and two community pharmacists. Questions were reworded, reformatted, and reordered in light of the feedback received. The final version consisted of 28 questions divided into four sections. The first section (seven items) gathered data on demographic characteristics of the community pharmacists, including age, sex, number of years of experience as a community pharmacist in Saudi Arabia, job status, number of medications dispensed per day, and number of antibiotics dispensed per day. The second section (six items) evaluated community pharmacists' knowledge about the legal status of DAwP and its implications with regards to growing AMR and public health. For each question in this section, respondents were given options of 'yes', 'no', and 'don't know' to choose from. The third section consisted of six questions that were designed to assess community pharmacists' attitudes towards DAwP. Respondents were given options of 'yes', 'no', and 'don't know' to choose from. A list of reasons for DAwP was also given and respondents were allowed to choose all applicable reasons. Respondents were also given the opportunity to add any additional reason not listed in the questionnaire. Finally, the fourth section evaluated practices of community pharmacists towards DAwP and consisted of seven questions (e.g., common antibiotics dispensed without prescription, common dosage forms, common medical conditions for which antibiotics are dispensed without prescription, asking about drug allergies, counselling about the dose and duration of treatment).

### 2.3. Sampling and data collection

The survey was conducted in the Makkah region (Makkah Province), one of the 13 administrative regions of Saudi Arabia, located in Western Saudi Arabia along the Red Sea coast. It is the most populous region of Saudi Arabia with a population density of 45/km$^2$ and consists of 12 governorates. All the rituals during Hajj are performed in the Makkah region.

Since no up-to-date list of community pharmacies was available to the authors, a four-step sampling approach was used for the purpose of this study in order to ensure generalizability and minimize selection bias. First, the two most populous governorates were selected (Makkah Al-Mukarrmah (capital city) and Jeddah). Second, each of these governorates was divided into four zones (south, north, east, and west). Third, a list of districts within each of these eight zones (two governorates $\times$ four zones) was compiled and six districts from each zone were selected randomly using random numbers. Finally, community pharmacies were selected by convenience sampling within each of the six randomly selected districts.

To gather data, selected community pharmacies were visited by five senior Pharm-D students who had received training in conducting research involving human participants. They were further trained in questionnaire administration. One student visited one pharmacy and invited the community pharmacist to complete the questionnaire after explaining the purpose of the study. If more than one pharmacist was working at a community pharmacy, both were requested to complete the questionnaire. Community pharmacists either completed the questionnaire on the spot or asked the interviewer to collect the questionnaire at a mutually agreed time in the near future.

### 2.4. Statistical analysis

Data were coded, entered, and analyzed using SPSS version 18.0 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics, frequencies and percentages, were used to summarize the data.

The Chi-square test or Fisher's exact test was used, as appropriate, to assess the association between demographic characteristics and practices towards DAwP. A *p*-value of less than 0.05 was considered statistically significant.

## 3. Results

### 3.1. Socio-demographic characteristics of respondents

Of 200 community pharmacists approached, 189 completed and returned the questionnaire (response rate 94.5%). More than two-thirds of the community pharmacists were Egyptian (74.1%). More than half of the pharmacists had more than 5 years of practice experience (55%). More than a quarter (27.9%) reported dispensing more than 300 medications per day and almost 90% reported dispensing less than 50 antibiotics per day. The demographic and professional characteristics of the participants are detailed in Table 1.

### 3.2. Knowledge and attitudes towards DAwP

More than two-thirds (70.5%) of the pharmacists participating in the study were not aware of the fact that DAwP is illegal in Saudi Arabia. More than half of the pharmacists (55%) believed that DAwP is a common practice among community pharmacists in Saudi Arabia. A vast majority of the pharmacists were aware that DAwP is contributing to the irrational use of antibiotics (77.2%) and the development of resistance (85.2%), and that AMR has become a public health issue (88.4%). Almost all of the pharmacists (93.7%) claimed that they encouraged patients to consult a physician before obtaining antibiotics and more than two-thirds of pharmacists (78.3%) thought that pharmacists should stop DAwP (Table 2).

### 3.3. Practices towards DAwP

Three of the most common reasons cited by community pharmacists for DAwP were lack of patient willingness to consult a physician for a non-serious infection (69.9%), inability to afford a consultation with a physician (65.3%), and pharmacists' good knowledge about antibiotic use (45.8%) (Table 3). Penicillins (72.5%), followed by cephalosporins (63.5%) and macrolides (40.7%), were the most common antibiotic classes dispensed without prescription. Colds and flu (68.4%), rhinitis (56.1%), and toothache (52.4%) were the three most common disease conditions for which antibiotics were dispensed without prescription. The oral dosage form (86.8%) was the most common antibiotic dosage form dispensed without prescription (Table 3).

More than two-thirds of the pharmacists claimed that they always asked the patient about drug allergies (76.9%) and kidney function (70.4%) before dispensing antibiotics (Table 4). Almost all of the pharmacists (88.9%) surveyed claimed that they always educated patients about the importance of adherence to and completion of the antibiotic course and asked them if they were taking any other medication for the same medical condition (81.0%) before dispensing antibiotics. There was a significant association between country of graduation and various practice aspects in dispensing antibiotics (Table 4). There was also a significant association between the number of antibiotics dispensed and educating the patient about the importance of adherence to and completion of the full course of antibiotics ($p = 0.007$) (Table 4).

**Table 1**
Demographic and professional characteristics of the respondents

| Characteristics | Number (%) |
|---|---|
| Age, years | |
| ≤30 | 74 (39.2) |
| 31–40 | 88 (46.6) |
| >41 | 27 (14.2) |
| Sex | |
| Male | 189 (100) |
| Female | 0 (0) |
| Country of graduation | |
| Saudi Arabia | 4 (2.1) |
| Egypt | 140 (74.1) |
| India | 16 (8.5) |
| Other | 29 (15.3) |
| Job status | |
| Owner | 3 (1.5) |
| Manager | 74 (39. 2) |
| Staff pharmacist | 112 (59. 3) |
| Community practice experience, years | |
| <3 | 36 (19.1) |
| 3–5 | 49 (25.9) |
| >5 | 104 (55) |
| Medicines dispensed per day | |
| ≤100 | 55 (29.1) |
| 101–200 | 51 (26.9) |
| 201–300 | 30 (15.9) |
| >300 | 53 (28.1) |
| Antibiotics dispensed per day | |
| ≤25 | 123 (65.1) |
| 26–50 | 49 (25.8) |
| >50 | 17 (8.9) |

## 4. Discussion

This is the first study to evaluate community pharmacists' knowledge, attitude, and practices towards DAwP in Saudi Arabia. Given the high incidence of DAwP in Saudi Arabia, as reported in earlier studies,[23,24] it is of fundamental importance to understand the community pharmacist's perspective so that appropriate

**Table 2**
Knowledge and attitudes towards dispensing antibiotics without prescription

| Item | Yes *n* (%) | No *n* (%) | Don't know *n* (%) |
|---|---|---|---|
| DAwP is a legal practice in Saudi Arabia | 48 (25.4) | 134 (70.5) | 6 (3.2) |
| DAwP is a common practice among community pharmacists in Saudi Arabia | 104 (55.0) | 66 (34.9) | 19 (10.1) |
| Do you think there is any problem if you dispense medication without prescription | 146 (77.2) | 36 (19.0) | 6 (3.2) |
| DAwP is contributing to the development of antimicrobial resistance | 161 (85.2) | 20 (10.6) | 8 (4.2) |
| Antibiotic resistance has become a public health issue | 167 (88.4) | 17 (9.0) | 5 (2.6) |
| DAwP is contributing to the inappropriate use of antibiotics by patients | 146 (77.2) | 30 (15.9) | 12 (6.3) |
| Pharmacists can be penalized for DAwP | 42 (22.2) | 128 (67.7) | 17 (9.0) |
| Pharmacists should stop DAwP | 148 (78.3) | 36 (19) | 4 (2.1) |
| I encourage patients to consult the physician and get a prescription | 177 (93.7) | 9 (4.8) | 3 (1.6) |
| When patients feel that they need an antibiotic, if not dispensed, they will try to obtain it from another pharmacy | 159 (84.1) | 912 (6.3) | 18 (9.5) |
| Refusing DAwP will negatively affect sales and profits | 100 (52.9) | 72 (38.1) | 16 (8.5) |

DAwP, dispensing antibiotics without prescription.

**Table 3**
Community pharmacists' practices towards dispensing antibiotics without prescription

| | *n* (%) |
|---|---|
| Reasons for DAwP[a] | |
| Pharmacists have good knowledge about antibiotic use | 87 (45.8) |
| Patients do not want to see a doctor unless the infection is serious | 132 (69.9) |
| Increased sales and profit pressure from the owner | 50 (26.8) |
| Patients cannot afford to consult a physician | 123 (65.3) |
| Fear of losing a client/patient | 32 (17.4) |
| Lack of awareness about rules and regulations against DAwP | 53 (28.4) |
| Commonly dispensed antibiotic classes[a] | |
| Penicillins | 137 (72.5) |
| Cephalosporins | 120 (63.5) |
| Macrolides | 77 (40.7) |
| Quinolones | 45 (23.8) |
| Tetracycline | 28 (14.8) |
| Common antibiotic dosage forms dispensed without prescription[a] | |
| Oral | 164 (86.8) |
| Eye drops | 110 (58.2) |
| Ear drops | 61 (32.3) |
| Topical | 123 (65.7) |
| Medical conditions for which antibiotics are dispensed without prescription[a] | |
| Colds and flu | 92 (68.4) |
| Rhinitis | 106 (56.1) |
| Diarrhoea | 57 (30.2) |
| Toothache | 99 (52.4) |
| Earache | 28 (14.8) |
| Other (e.g., eye infection, wound, UTI) | 41 (21.7) |

DAwP, dispensing antibiotics without prescription; UTI, urinary tract infection.
[a] Respondents were allowed to choose more than one option.

interventions and policies can be designed and implemented to address this alarming issue in the greater public health interest.

Only a quarter of pharmacists in this study were aware that DAwP is illegal and that community pharmacists can be penalized for this malpractice in Saudi Arabia. This can partly explain their indulgence in non-prescription sales of antibiotics. Saudi Arabia largely relies on foreign qualified community pharmacists, as was evident in this study as well, who may not fully understand the local regulations and policies prohibiting over-the-counter sales of antibiotics. Given that the community pharmacists in the present study were, in general, aware of the negative implications of DAwP in terms of the development and spread of AMR, increasing awareness about the local rules and regulations could potentially reduce the sales of antibiotics.

The present findings indicate that penicillins are the most commonly dispensed antibiotics without prescription, consistent with the findings of Abdulhak et al.,[23] who reported that amoxicillin/clavulanate was the most commonly prescribed antibiotic in Riyadh, Saudi Arabia. This can partly explain the increase in resistance to penicillins among community-acquired infections caused by *Streptococcus pneumoniae* in Saudi Arabia.[27] However, the role of DAwP in the development and spread of AMR is not known.[28] Nevertheless, DAwP is considered to play a fundamental role in the development of AMR, as countries with high levels of AMR have a high incidence of non-prescription antimicrobial sales and use in the community.[29–31]

In this study, more than two-thirds of the pharmacists claimed that they asked patients about drug allergies and explained the side effects before dispensing antibiotics, in contrast to the findings of Abdulhak et al., who conducted a study in the city of Riyadh and reported that none of the pharmacists interviewed asked about drug allergies, side effects, or drug interactions.[23] The differences in the findings can be attributed to the phenomenon of social desirability bias – the tendency of respondents to choose socially acceptable responses rather than choosing responses that mirror their true feelings or practices.[32] Abdulhak et al. used simulated patients to assess dispensing practices of community pharmacists in their study, unlike the present study in which the respondents were asked to complete a self-administered questionnaire, prone to social desirability bias.[23]

### 4.1. Implications for pilgrims

DAwP is a common practice in Makkah region, which may partially explain the overuse of antibiotics among pilgrims documented in earlier studies.[33] Given the high prevalence of infectious diseases among pilgrims and the significant risk of acquisition and transmission of AMR associated with mass gatherings,[34] the rational use of antibiotics is crucial to effectively treat the infection and curtail the global spread of AMR. DAwP remains a barrier in ensuring the appropriate use of antibiotics, as the non-prescription use of antimicrobials has been associated with shorter courses and irrational drug and dose choices.[8–12] In addition to focusing on infection control strategies, increasing awareness among pilgrims about antibiotic use and training and engaging community pharmacists in the treatment of minor ailments could be effective methods to reduce self-medication and the non-prescription use of antibiotics among pilgrims. However, the effectiveness of such interventions has yet to be evaluated.

**Table 4**
Association between DAwP practices and demographic and professional characteristics of the pharmacists

| Item | Always *n* (%) | Never *n* (%) | Sometimes *n* (%) | Country of graduation, *p*-value | Experience, *p*-value | Medications dispensed/day, *p*-value | Antibiotics dispensed/day, *p*-value |
|---|---|---|---|---|---|---|---|
| When dispensing antibiotics I ask patients about drug allergies | 143 (76.9) | 14 (7.5) | 29 (15.6) | 0.006[a,b] | 0.859 | 0.26[a] | 0.22[a] |
| When dispensing antibiotics without prescription, I ask patients if they have any kidney problem | 133 (70.4) | 20 (10.5) | 32 (16.8) | 0.37[a] | 0.14[a] | 0.04[a,b] | 0.82 |
| When dispensing antibiotics without prescription, I warn patients about the potential side effects of the medicines | 122 (64.6) | 14 (7.4) | 47 (24.9) | 0.72[a] | 0.74 | 0.216[a] | 0.44[a] |
| When dispensing antibiotics without prescription, I educate patients about the importance of adherence and completing the full course of antibiotics | 168 (88.9) | 4 (2.1) | 11 (5.8) | 0.04[b] | 0.61[a] | 0.121 | 0.007[a,b] |
| When dispensing antibiotics without prescription, I ask patients if they are taking any other medication for the same complaint | 153 (81.0) | 7 (3.7) | 23 (12.2) | 0.01[a,b] | 0.05[a] | 0.88[a] | 0.73[a] |
| I don't dispense antibiotics without prescription for children | 116 (61.4) | 33 (17.5) | 38 (20.1) | 0.06[a] | 0.30 | 0.26 | 0.45 |

DAwP, dispensing antibiotics without prescription;
[a] *p*-Value calculated through Fisher's exact test; the rest are through the Chi-square test.
[b] $p < 0.05$ considered statistically significant results.

### 4.2. Implications for health policy

A multifaceted approach is needed to effectively tackle the issue of DAwP in Saudi Arabia. Firstly, national regulations governing the sale of antibiotics should be strictly implemented. A study evaluating the impact of restriction on over-the-counter sales of antibiotics in Brazil and Mexico reported a significant reduction in the level of consumption of antibiotics (−1.35 defined daily doses per 1000 inhabitants per day (DDD/TID) for Brazil ($p < 0.01$) and −1.17 DDD/TID for Mexico ($p < 0.001$)).[18] Similarly, resistance profiles have been reported to have improved in Chile[35] and South Korea[36] following the implementation of regulations prohibiting over-the-counter sales of antibiotics. Secondly, educational interventions should be designed to increase community pharmacists' compliance with the code of ethics and professionalism. It has been reported that community pharmacists' attitudes such as patient complacency, external responsibility, indifference, and insufficient knowledge, are associated with DAwP; however, no association was found with any of the pharmacists' personal or professional traits.[16] Furthermore, the authors argued that since attitudes are potentially modifiable, educational strategies targeted at changing attitudes could markedly improve compliance with antibiotic dispensing regulations.[16] Finally, improving access to healthcare for the general public and increasing awareness in regard to antibiotic misuse could also reduce non-prescription sales of antibiotics.[27] The Saudi health authorities should devise plans for improving access, especially for expatriate labourers and other underprivileged workers who currently do not have access to governmental healthcare facilities and have to rely on employer-funded health insurance schemes that are often inadequate. In this study, an inability to afford a consultation with a physician was the most common reason cited by community pharmacists for DAwP, in line with the findings of various international studies. Therefore, improving access to and affordability of healthcare is crucial to combat DAwP.

### 4.3. Limitations

There are two key limitations to the findings of this study. Since this study was conducted in Makkah region only, the findings may not represent the knowledge, attitude, and practices of community pharmacists practicing in other parts of the country. However, it should be noted that a four-step systematic approach was used to recruit community pharmacists for this study. Furthermore, the study sample was diverse in terms of ethnicity, years of experience, and size of the business, therefore it can be assumed that studies conducted in other parts of the country would report similar if not identical findings. Secondly, as mentioned before, self-administered questionnaires such as the one used in this study are prone to social desirability bias. Future research should investigate the differences in what pharmacists 'claim' about their practices and what they actually do in real practice.

### 4.4. Conclusions

Community pharmacists are generally not aware of the regulations and policies prohibiting the sale of antibiotics without prescription. This lack of awareness is potentially contributing to high rates of DAwP in Saudi Arabia. However, the pharmacists are well aware of the negative impact of DAwP on public health. A comprehensive multifaceted approach consisting of educational interventions targeting both community pharmacists and the general public, strict implementation of regulations, and improving access to and affordability of healthcare could potentially reduce the incidence of DAwP and the self-use of antibiotics in Saudi Arabia, which would lead to an improvement in the country's AMR profile.

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