



Community pharmacist intervention in doxycycline self-medication for acne among pregnant women in Saudi Arabia

Marwan Alrasheed^{*}, Wael Hamdy Mansy, Mohamed Naser Al-Arifi

Department of Clinical Pharmacy, College of Pharmacy King Saud University, Riyadh 12372, Saudi Arabia

ARTICLE INFO

Keywords:

Saudi pharmacist
Acne vulgaris
Self-medication
Doxycycline
Pregnancy

ABSTRACT

Introduction: Self-medication during pregnancy remains a prevalent global phenomenon, with pregnant women often relying on their own judgment to manage symptoms. **Objective:** This study aimed to assess community pharmacist practice regarding self-medication requests for acne treatment in pregnant women within Saudi Arabia.

Methods: A descriptive, observational cross-sectional study was conducted in Riyadh, Saudi Arabia. Community pharmacists completed a questionnaire after interacting with a simulated customer (SC) seeking doxycycline for a pregnant woman. Data were analyzed using SPSS software.

Results: One hundred community pharmacists participated in the study. The majority were between 25 and 35 years old (56 %) and worked in chain pharmacies (81 %). Notably, 71 % requested a prescription before dispensing any medication. While 66 % advised the SC to consult a physician or dermatologist, only 15 % inquired about the pregnancy and related information of the SC's sister.

Conclusion: This study suggests a positive trend in community pharmacy practice regarding self-medication requests during pregnancy. However, further improvement is needed, particularly in terms of in-depth inquiry about pregnancy status and potential risks associated with specific medications. Collaborative efforts between the Ministry of Health (MOH), Saudi Food and Drug Administration (SFDA), and pharmacy education programs are crucial to minimize inappropriate dispensing practices and ensure optimal patient safety.

1. Introduction

Self-medication is becoming more prevalent in everyday life, resulting in unexpected incidents among patients and healthcare practitioners (Ruiz, 2010; Mahmoud et al., 2020; Montastruc et al., 2016). Self-medication is described as using medicines to cure oneself at one's own risk without a physician's prescription (Bennadi, 2013). Self-medication is indicated in treatment of multiple disease conditions, such as the management of influenza, cough, myalgia, headaches, and acne (Ruiz, 2010; Mahmoud et al., 2020). The concept of self-medication mainly involves using over-the-counter (OTC) drugs to treat minor and significant patient complications. However, studies have shown that individuals in developing countries often resort to self-medicating with prescription-only medications, even for minor health concerns. (Yusuff and Omarusehe, 2011; Albassam and Awad, 2018). This practice is prevalent in both developed and developing nations, with a self-medication prevalence of 30 % and 45 %, respectively

(Ateshim et al., 2019). In Saudi Arabia, a recent study estimated the prevalence of self-medication with antibiotics at 34 % (Alghadeer et al., 2018). According to recent literature, self-medication is particularly common among pregnant women, with an estimated prevalence of 34.8 % (Botyar et al., 2018). The primary drivers of this widespread practice appear to be the prevalence of mild illnesses and financial constraints. (Botyar et al., 2018). Among pregnant women, acne is the most common pregnancy-related skin condition. (Botyar et al., 2018; Mohseni et al., 2018). This prevalence often leads to increased demand for dermatological consultations to manage acne-related issues during pregnancy (Rothman and Pochi, 1988).

Despite the prevalence of acne among pregnant women, its severity can vary significantly throughout pregnancy. Studies have demonstrated fluctuations in acne prevalence across trimesters (Botyar et al., 2018; Mohseni et al., 2018; Rothman and Pochi, 1988). This variability is attributed to hormonal changes, particularly increased androgen and oil production levels, which fluctuate throughout the pregnancy cycle

Peer review under responsibility of King Saud University.

^{*} Corresponding author.

E-mail addresses: Malrasheed1@ksu.edu.sa (M. Alrasheed), wseyed@ksu.edu.sa (W. Hamdy Mansy), malarifi@ksu.edu.sa (M. Naser Al-Arifi).

<https://doi.org/10.1016/j.jsps.2024.102027>

Received 17 December 2023; Accepted 12 March 2024

Available online 13 March 2024

1319-0164/© 2024 The Author(s). Published by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

(Rothman and Pochi, 1988; How to get rid of acne during pregnancy | Pregnancy Breakout | Mid-Atlantic Women's Care [Internet], 2020). The FDA's Pregnancy Categories A, B, C, D and X offer a risk-assessment framework for healthcare providers, classifying medications based on potential fetal harm during pregnancy. This system aids in balancing the potential benefits of a medication against its risks for pregnant patients (Sachdeva et al., 2009). Doxycycline, recognized for its broad therapeutic spectrum, stands as a notably effective and cost-efficient antibiotic, particularly valuable in the treatment of acne vulgaris. Regrettably, the designation of tetracyclines as class D pregnancy-prohibited medications has cast a shadow over their advantages. The increasing body of evidence supporting the efficacy of doxycycline in treating critical diseases prompts a reevaluation of its use during pregnancy and childhood. Past research has established associations between doxycycline and severe congenital malformations, highlighting potential fetal teratogenicity (Cooper et al., 2009).

Community pharmacists serve as frontline healthcare professionals, easily accessible to patients without the need for appointments. They play a pivotal role in recommending treatment for both acute and chronic complications, including addressing pregnancy-associated acne (Abeje et al., 2015; Divine and McIntosh, 2020). Extensive research underscores the critical role community pharmacists play in guiding responsible medication use, particularly when it comes to self-medication. Previous studies conducted in Saudi Arabia and other countries have highlighted instances where self-medication interactions within community pharmacies were inadequately managed (Benrimoj et al., 2007; Fitzpatrick and Tumlinson, 2017; Bin Abdulhak et al., 2011; Bawazir, 1992; Zawahir et al., 2019). Furthermore, the prevalence of self-medication in Saudi Arabia has been steadily increasing (Aljadhey et al., 2015; Al Rasheed et al., 2016; Al Essa et al., 2019; Alrabiah et al., 2023). This current study marks the first of its kind in Saudi Arabia, aiming to explore the role of community pharmacies in mitigating the risks associated with self-medication involving doxycycline during pregnancy.

2. Materials and methods

2.1. Study design

A cross-sectional study involving prospective interviews was conducted in Saudi Arabia from January to March 2022 to assess the management of pregnant women's self-medication requests for doxycycline. Our target participants were pharmacists working at community pharmacies in the Riyadh region.

2.2. Data collection

Data collection was carried out in two phases: an initial simulated client (SC) visit followed by face-to-face interviews. The SC Method often known as "mystery customers," is a data collection strategy that has been widely used in medical research. The SC technique entails a group of researchers or members acting in the role of an actual customer or patient at a healthcare facility. The SC techniques can aid in overcoming challenges in obtaining reliable healthcare quality indicators and improving the validity of quality assessments, particularly in low and middle income countries (Benrimoj et al., 2007; Fitzpatrick and Tumlinson, 2017; Alrasheedy et al., 2017; Alrasheedy et al., 2020). The SC was a senior PharmD student at King Saud University who received careful training with the help of working community pharmacists (CPs) who were members of the research team. The SC had to memorize the questionnaires to complete them.

SC appointed for this study, visited community pharmacies located in Riyadh, the capital of Saudi Arabia. Engaged in a telephonic conversation with her pregnant sister, the SC approached a licensed CP at the counter and inquired about obtaining doxycycline for her sister. The SC informed the CP that all details discussed here would be received and

recorded by her sister (the simulated patient) on the phone, which was a data collector filling a standardized data collection form developed from previous SC studies (Tawfik et al., 2021). Appendix presents the information provided to address any queries raised by the pharmacists. Pharmacists were not provided with any information upfront; they were required to actively elicit necessary details. In the absence of any questions from the pharmacist, the SC would disclose her sister's pregnancy status and inquire about the suitability of doxycycline for her sister's condition. The SC visits were unannounced to ensure the pharmacists' natural responses. Prior to the study's commencement, two clinical pharmacy professors and a senior researcher thoroughly reviewed and validated the scenario. Additionally, a research team of three individuals evaluated the questionnaire developed to assess the pharmacists' prescribing quality.

2.3. Data collection

Data pertaining to each pharmacy visit were meticulously recorded using a standardized data collection form adapted from previously conducted SC studies (Tawfik et al., 2021). This form captured pharmacy-related variables such as the qualifications, years of practice in Saudi Arabia, gender, country of qualification, and age (in years) of pharmacy workers. Additionally, visit-related variables, including the information gathered from the SC prior to dispensing doxycycline, alternative medication options presented, and recommendations and advice provided by pharmacy staff, were also documented.

A total of 100 pharmacies were randomly selected for subsequent follow-up interviews. The interview form, with minor modifications, was developed based on previously conducted research (Zawahir et al., 2019; Tawfik et al., 2021). Initially, the form sought information about the community pharmacies where the interviews were conducted and the characteristics of the working staff. Subsequently, using binary response options, interviewees were asked to report on their customary information-gathering practices. Finally, after being assured that their information would be kept confidential and utilized exclusively for research purposes, interviewees provided their informed consent to participate in the study.

2.4. Data analysis

A descriptive analysis was conducted among for the demographic

Table 1
Demographic data of community pharmacists.

Characteristics	N (%)
Age group	
25–35	56 (56)
36–45	38 (38)
45–55	3 (3)
56–65	2 (2)
Graduated country	
Egypt	72 (72.)
Saudi Arabia	18 (18.)
Yemen	5 (5)
Other countries	5 (5)
Pharmacy type	
Chain community pharmacy	81 (81)
Independent community pharmacy	18 (18)
Time work in community pharmacy in Saudi Arabia	
< 6 months	12 (12)
> 6 months	9 (9)
One year or more	8 (8)
2 years or more	71 (71)
Years of practice *	
< 1 years	6 (6)
1 < 5 years	17 (17)
10 to 20 years	32 (32)
20 years or more	40 (40)

*missing response.

Table 2

Information gathering and counseling practice provided by Community pharmacist after knowing about SC's sister's pregnancy.

Items	Yes N (%)	No N (%)
1. Questions asked by CPs to SC		
Asked about the presence of prescription	71 (71)	29 (29)
Asked about the presence of symptoms	36 (36)	64 (64)
Asked about the history of medication use	4 (4)	96 (96)
Asked about the pregnancy information	15 (15)	85 (85)
2. Counseling practice provided by a community pharmacist		
Provided rationale either for dispensing or not	99 (99)	1 (1)
3. Suggested other treatment alternatives by a Saudi community pharmacist	42 (42.0)	30 (30)
A. Soap	16 (16)	53 (53)
B. Topical cream-gel	30 (30)	41(41)
C. Other preparations	44 (44)	28 (28)
4. Advise SC to consult a physician or a dermatologist	66 (66)	34 (34)
5. Give SC some advice about non-pharmacologic management of acne	16 (16)	83 (83)

variables for our study which are age group, graduate country, pharmacy type, time work in community pharmacy in Saudi Arabia, and years of practice as well as for the information that was provided by the Community pharmacist by applying the frequency and percentages. The Statistical Package for Social Sciences (SPSS) version 26.0 was used to enter and analyze the data (IBM Corp, Armonk, US).

3. Results

3.1. Characteristics of study subjects

A total of 100 community pharmacists were recruited for the current study and willingly completed the questionnaire. The majority of the participants (56 out of 100; 56 %) were within the age range of 25 to 35 years. Egyptians constituted the largest demographic group, representing almost 72 % (72 out of 100) of the participating pharmacists. Notably, 81 % (81 out of 100) of the pharmacists had experience working in chain community pharmacies, and 71 % (71 out of 100) had been practicing in Saudi Arabia for two years. Table 1 provides a detailed overview of the demographic and other characteristics of the study subjects.

3.2. Client simulation visit

Throughout the study, none of the community pharmacists identified the simulated client (SC) or PharmD student as such. Before dispensing doxycycline to the SC's sister, the CPs gathered detailed information.

During the SC's visit, 71 % of the community pharmacists inquired about the presence of a prescription, while 36 % inquired about the current symptoms. Only 15 % of the CPs delved into the pregnancy status and related details of the SC's sister. Although all CPs provided a rationale for dispensing doxycycline (99.0 %), 66.0 % of the interviewed CPs advised the SC to consult a physician or dermatologist for her sister's case (Table 2).

Community pharmacists often mentioned pregnancy as a reason for not dispensing doxycycline to simulated client sister (76 %), followed by 46 % who said pregnant women should not take any drug without physician consultation. Finally, 33 % (n = 33) of the CPs said that topical acne medications are safer than oral medications (Fig. 1).

4. Discussion

This study is the first, to our knowledge, to evaluate how community pharmacists in Saudi Arabia manage self-medication requests for doxycycline use among pregnant women seeking treatment for acne vulgaris. While existing international literature reports on general public and pharmacist attitudes and knowledge regarding self-medication with antibiotics (Sambakunsi et al., 2019; Elmahi et al., 2022; Lv et al., 2014; Horvat et al., 2022). This research delves deeper into a specific population and medication with potentially significant safety implications. By providing valuable insights into current practices and identifying areas for improvement, this study has the potential to significantly contribute to the safety of drug use during pregnancy and beyond. Specifically, it aims to address medication-related errors in pregnancy and improve prescribing patterns among community pharmacists for special populations like pregnant and breastfeeding women.

Despite the classification of most antibiotics as category C or D, indicating potential fetal risk and contraindication for many pregnant women, a significant portion of users still obtain them without a prescription (Walling, 2006; Wolters Kluwer | Lexicomp [Internet], 2023; Mainous et al., 2009; Boyd et al., 2017). This underscores the critical need to understand community pharmacists' practices and dispensing patterns for antibiotics during pregnancy to ensure safe and appropriate medication use for this vulnerable population. Our findings reveal that a significant majority of community pharmacists (71 %) in our study requested a prescription before dispensing antibiotics to the simulated client's sister. This is encouraging, as it surpasses the rates reported in previous studies. Notably, Tawfik et al. observed that only 31.4 % of Egyptian pharmacists checked for prescriptions before dispensing antibiotics to pregnant women (Tawfik et al., 2021). Similarly, Zawahiri et al. found that 47 % of pharmacists dispensed antibiotics without a prescription (Zawahiri et al., 2019). However, a previous study in Saudi Arabia by Al-Enazi et al. reported a significantly higher rate, with 77.6 %

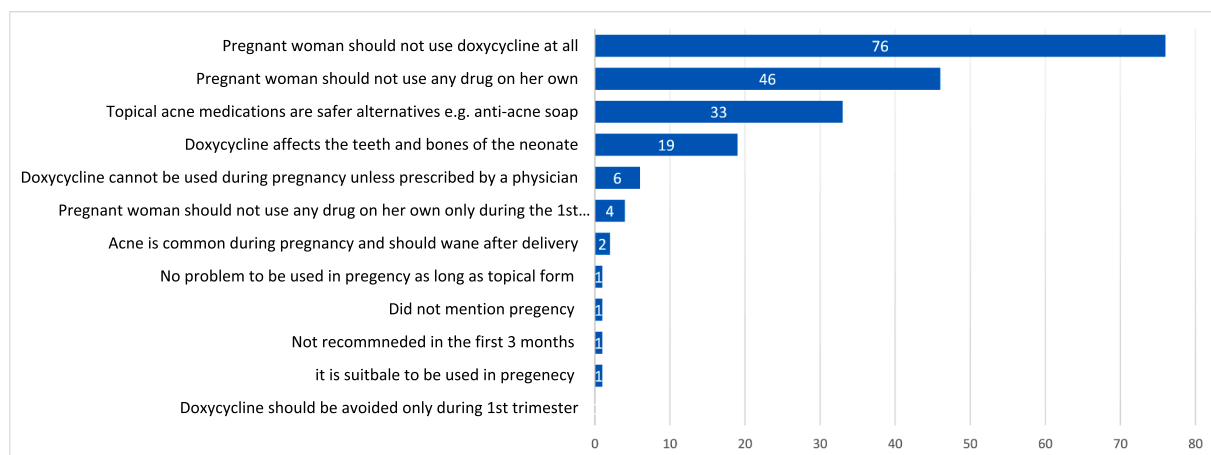


Fig. 1. Rationale for not dispensing doxycycline. (multiple rationales apply).

of pharmacists dispensing antibiotics without a medical prescription (Bin Abdulhak et al., 2011). The elevated frequency of antibiotic sales without a prescription in both recent and past studies can be attributed to various factors. These may encompass inadequate enforcement of national regulations, non-compliance among community pharmacists with the established code of ethics and professionalism, as well as financial interests influencing the behavior of community pharmacists (Bawazir, 1992).

Previous studies conducted in developing countries and Saudi Arabia revealed alarming trends, with a majority of pharmacists (77 %) failing to inquire about pregnancy status before dispensing antibiotics (Zawahir et al., 2019; Tawfik et al., 2021). This contrasts significantly with the current study, where only 15 % of pharmacists neglected this crucial step. Furthermore, another Saudi Arabian study found instances of community pharmacists prescribing ciprofloxacin, an FDA class C drug, to women of childbearing age without verifying pregnancy status (Bin Abdulhak et al., 2011). This disregard for patient safety raises serious concerns, as it increases the risk of developing antibiotic resistance and severe adverse events, particularly among pregnant women.

The primary reason cited by community pharmacists for not dispensing doxycycline in this study was its contraindication for pregnant women (76 %). This was followed by concerns about the risks of self-medication during pregnancy in general (46 %). Topical acne medications, such as anti-acne soap (33 %), were proposed as safer alternatives. Additionally, some pharmacists (19 %) highlighted the potential adverse effects of doxycycline on the teeth and bones of the developing baby. Finally, a small percentage (6 %) emphasized the need for a physician's prescription before using doxycycline during pregnancy. These findings align with those reported by Tawfik et al., who found that 37 % of pharmacists who refrained from dispensing doxycycline cited concerns about its impact on the fetus's teeth and bones. In contrast, 27 % of pharmacists believed the medication should only be avoided during the first trimester, and 10 % advised against self-medication with any medications during pregnancy (Tawfik et al., 2021). These results confirm that community pharmacists in Saudi Arabia generally adhere to the prescribing laws introduced by the Ministry of Health (MOH) (Alrasheedy et al., 2020). This finding aligns with previous research, which observed a decrease in antibiotic dispensing behavior among community pharmacists in Saudi Arabia (Alrasheedy et al., 2020; Al-Mohamadi et al., 2013).

Globally, combating the misuse and overuse of antibiotics requires a multifaceted approach. While some countries like Brazil have successfully implemented restrictive legal measures on over-the-counter medications, leading to demonstrably reduced antibiotic use (Impact of Over-the-Counter Restrictions on Antibiotic Consumption in Brazil and Mexico | PLOS ONE [Internet], 2023), other nations face different challenges. In Egypt, for example, current community pharmacy practices pose a significant risk to pregnant women, as a study revealed widespread dispensing of doxycycline to this vulnerable population despite its contraindications (Tawfik et al., 2021). This alarming finding necessitates the urgent implementation of stricter legislation across Saudi Arabia and other nations to effectively curb inappropriate antibiotic dispensing by community pharmacists. Beyond legal measures, addressing the root causes of antibiotic misuse is equally crucial. Public awareness campaigns focused on responsible antibiotic use and empowering pharmacists to refuse requests for inappropriate medications can play a vital role. Additionally, exploring alternative solutions for common ailments, addressing the underlying factors that contribute to self-medication, and ensuring access to healthcare services for all are essential strategies in the fight against antibiotic resistance. By implementing a comprehensive approach that combines legal frameworks, awareness campaigns, professional empowerment, and systemic reforms, we can effectively control self-medication rates among high-risk populations like pregnant women and safeguard public health on a global scale.

Raising awareness about the dangers of self-medication during pregnancy is crucial. Despite widespread knowledge of potential adverse effects, many individuals resort to self-medication for pregnancy and minor ailments (Mahmoud et al., 2020; Alghadeer et al., 2018). However, our study has limitations that warrant consideration. Firstly, our sample included only 100 pharmacies within the capital city of Saudi Arabia. This limited sample size and geographical focus may hinder the generalizability of our findings to pharmacies across the country, particularly those in rural or less urbanized areas. Future studies should aim for a larger and more diverse sample, encompassing various regions and pharmacy types, to enhance representativeness. Secondly, Due to logistical challenges, we were unable to obtain audio recordings of pharmacist-patient interactions. This reliance on self-reported data potentially limits the depth of our analysis as it may not fully capture nuances in communication styles, information provision, and the complexities of pharmacist-patient interactions. Employing observational methods or obtaining audio recordings (with appropriate consent) in future research would enhance data richness and allow for a more comprehensive understanding of the factors influencing self-medication practices. It's important to acknowledge the potential for response bias inherent in self-report data. Future research could incorporate strategies to mitigate this bias, such as extensive triangulation of data sources and implicit measures. These limitations highlight the need for future studies designed with larger, more diverse samples, utilizing multifaceted data collection methods, and accounting for potential biases. Such research is crucial for a robust understanding of self-medication practices, ultimately leading to the development of more targeted and effective interventions.

5. Conclusions

This study reveals a positive trend in community pharmacy practice regarding doxycycline dispensing during pregnancy compared to previous research in the Middle East, suggesting a move away from sub-optimal practices associated with self-medication in this vulnerable population. To balance expected therapeutic benefit and possible risk during pregnancy, community pharmacists have to be prepared to assess each patient's particular situation and implement necessary improvements. To achieve this, educational and legislative interventions are crucial, aiming to elevate the position of community pharmacists within the Saudi healthcare system. Additionally, expanding research to analyze the diverse roles and practices of community pharmacists across different settings and regions within Saudi Arabia will provide valuable insights for further improvement.

CRedit authorship contribution statement

Marwan Alrasheed: Conceptualization, Writing – original draft, Writing – review & editing, Investigation, Validation, Supervision, Resources. **Wael Hamdy Mansy:** Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Methodology, Project administration, Software. **Mohamed Naser Al-Arifi:** Conceptualization, Writing – original draft, Writing – review & editing, Visualization, Formal analysis, Resources, Project administration, Software.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

Researchers Supporting Project number (RSP-81-2024), King Saud University, Riyadh, Saudi Arabia.

Appendix

Table A1
SC characters and case information.

Patients and Simulated client character and case information	
Patient	
Age	24
Gender	Female
Medical condition	Uncontrolled acne
	Pregnant
Medication request	Doxycycline
Simulated Client (SC)	
Age	24
Gender	Female
Relationship to patient	Sister
Phrase used during pharmacy visit	I heard that doxycycline is safe, effective, and economical so one can offer it easily. Please Dr., we are looking for your advice?
Knowledge of doxycycline	Believes it is safe, effective, and economical
Disclosure	- Did not initially disclose SC role
	- Did not disclose further information until asked by the pharmacist

References

Abeje, G., Admasie, C., Wasie, B., 2015. Factors associated with self medication practice among pregnant mothers attending antenatal care at governmental health centers in Bahir Dar city administration, Northwest Ethiopia, a cross sectional study. *Pan. Afr. Med. J.* 20, 276.

Al Essa, M., Alshehri, A., Alzahrani, M., Bustami, R., Adnan, S., Alkeraidees, A., et al., 2019 Feb 1. Practices, awareness and attitudes toward self-medication of analgesics among health sciences students in Riyadh, Saudi Arabia. *Saudi Pharm. J.* 27 (2), 235–239.

Al Rasheed, A., Yagoub, U., Alkhashan, H., Abdelhay, O., Alawwad, A., Al Aboud, A., et al., 2016 Jan. Prevalence and predictors of self-medication with antibiotics in al Wazarat health center, Riyadh City, KSA. *BioMed. Res. Int.* 5 (2016), e3916874.

Albassam, A., Awad, A., 2018 Jan 1. Community pharmacists' services for women during pregnancy and breast feeding in Kuwait: a cross-sectional study. *BMJ Open* 8 (1), e018980.

Alghadeer, S., Aljuaydi, K., Babelghaith, S., Alhammad, A., Alarifi, M.N., 2018 Jul. Self-medication with antibiotics in Saudi Arabia. *Saudi Pharm. J. SPJ Off. Publ. Saudi Pharm. Soc.* 26 (5), 719–724.

Aljadhey, H., Assiri, G.A., Mahmoud, M.A., Al-Aqeel, S., Murray, M., 2015 Mar 1. Self-medication in Central Saudi Arabia: Community pharmacy consumers' perspectives. *Saudi Med. J.* 36 (3), 328–334.

Al-Mohamadi, A., Badr, A., Bin Mahfouz, L., Samargandi, D., Al, A.A., 2013 Jan. Dispensing medications without prescription at Saudi community pharmacy: Extent and perception. *Saudi Pharm. J. SPJ Off. Publ. Saudi Pharm. Soc.* 21 (1), 13–18.

Alrabiah, Z., Arafah, A., Rehman, M.U., Babelghaith, S.D., Syed, W., Alrashidi, F.K., et al., 2023 Jan. Prevalence and self-medication for acne among students of health-related science colleges at King Saud University in Riyadh region Saudi Arabia. *Medicina (Mex)* 59 (1), 52.

Alrasheedy, A.A., Alsalloum, M.A., Almuqbil, F.A., Almuzaini, M.A., Aba Alkhayl, B.S., Albishri, A.S., et al., 2020 Jan. The impact of law enforcement on dispensing antibiotics without prescription: a multi-methods study from Saudi Arabia. *Expert Rev. Anti Infect Ther.* 18 (1), 87–97.

Alrasheedy AA, Hassali MA, Wong ZY, Aljadhey H, AL-Tamimi SK, Saleem F. *Pharmaceutical Policy in Saudi Arabia*. In: Babar ZUD, editor. *Pharmaceutical Policy in Countries with Developing Healthcare Systems* [Internet]. Cham: Springer International Publishing; 2017 [cited 2023 Nov 29]. p. 329–47. Available from: https://doi.org/10.1007/978-3-319-51673-8_16.

Ateshim, Y., Bereket, B., Major, F., Emun, Y., Woldai, B., Pasha, I., et al., 2019 Jun 10. Prevalence of self-medication with antibiotics and associated factors in the community of Asmara, Eritrea: a descriptive cross sectional survey. *BMC Public Health* 19 (1), 726.

Bawazir, S.A. (1992) Prescribing Patterns at Community Pharmacies in Saudi Arabia. *International Pharmacy Journal*, 6, 222-224. - References - Scientific Research Publishing [Internet]. [cited 2023 Nov 29]. Available from: [https://www.scirp.org/\(S\(i43dyn45teexjx455qlt3d2q\)\)/reference/ReferencesPapers.aspx?ReferenceID=1548872](https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=1548872).

Bennadi, D., 2013 Dec. Self-medication: A current challenge. *J. Basic Clin. Pharm.* 5 (1), 19–23.

Benrimoj, S.I., Werner, J.B., Raffaele, C., Roberts, A.S., Costa, F.A., 2007 Oct. Monitoring quality standards in the provision of non-prescription medicines from Australian Community Pharmacies: Results of a national programme. *Qual. Saf. Health Care* 16 (5), 354–358.

Bin Abdulhak, A.A., Altannir, M.A., Almansor, M.A., Almohaya, M.S., Onazi, A.S., Marei, M.A., et al., 2011 Jul. Non prescribed sale of antibiotics in Riyadh, Saudi Arabia: A cross sectional study. *BMC Public Health* 7 (11), 538.

Botyar, M., Kashanian, M., Abadi, Z.R.H., Noor, M.H., Khoramroudi, R., Monfaredi, M., et al., 2018. A comparison of the frequency, risk factors, and type of self-medication in pregnant and nonpregnant women presenting to Shahid Akbar Abadi teaching hospital in Tehran. *J. Fam. Med. Prim. Care* 7 (1), 124–129.

Boyd, S.E., Moore, L.S.P., Gilchrist, M., Costelloe, C., Castro-Sánchez, E., Franklin, B.D., et al., 2017 May 1. Obtaining antibiotics online from within the UK: a cross-sectional study. *J. Antimicrob. Chemother.* 72 (5), 1521–1528.

Cooper, W.O., Hernandez-Diaz, S., Arbogast, P.G., Dudley, J.A., Dyer, S.M., Gideon, P.S., et al., 2009 Jan. Antibiotics potentially used in response to bioterrorism and the risk of major congenital malformations. *Paediatr. Perinat. Epidemiol.* 23 (1), 18–28.

Divine H, McIntosh T. Chapter 2: Pharmacists? Patient Care Process in Self-Care. In: *Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care, 20th Edition* [Internet]. The American Pharmacists Association; 2020 [cited 2023 Nov 29]. Available from: <https://pharmacylibrary.com/doi/abs/10.21019/9781582123172.ch2>.

Elmahi, O.K.O., Musa, R.A.E., Shareef, A.A.H., Omer, M.E.A., Elmahi, M.A.M., Altamih, R.A.A., et al., 2022. Perception and practice of self-medication with antibiotics among medical students in Sudanese universities: A cross-sectional study. *PLoS One* 17 (1), e0263067.

Fitzpatrick, A., Tumlinson, K., 2017 Mar 24. Strategies for optimal implementation of simulated clients for measuring quality of care in low- and middle-income countries. *Glob. Health Sci. Pract.* 5 (1), 108–114.

Horvat, O., Petrović, A.T., Paut Kusturica, M., Bukumirić, D., Jovančević, B., Kovacević, Z., 2022 Aug 10. Survey of the knowledge, attitudes and practice towards antibiotic use among prospective antibiotic prescribers in Serbia. *Antibiot. Basel Switz.* 11 (8), 1084.

How to get rid of acne during pregnancy | Pregnancy Breakout | Mid-Atlantic Women's Care [Internet]. 2020 [cited 2023 Nov 29]. Available from: <https://www.midatlanticticwomenscare.com/why-acne-during-pregnancy-is-common-and-how-to-get-rid-of-it/>.

Impact of Over-the-Counter Restrictions on Antibiotic Consumption in Brazil and Mexico | PLOS ONE [Internet]. [cited 2023 Nov 29]. Available from: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0075550>.

Lv, B., Zhou, Z., Xu, G., Yang, D., Wu, L., Shen, Q., et al., 2014 Jul. Knowledge, attitudes and practices concerning self-medication with antibiotics among university students in western China. *Trop. Med. Int. Health TM IH* 19 (7), 769–779.

Mahmoud, M., Ali, W., Naqvi, A., Samreen, S., Althagfan, S., Al-Worafi, Y., 2020 Feb. Self-medication with antibiotics: A cross-sectional community-based study. *Lat. Am. J. Pharm.* 5 (39), 348–353.

Mainous, A.G., Everett, C.J., Post, R.E., Diaz, V.A., Hueston, W.J., 2009 Sep. Availability of antibiotics for purchase without a prescription on the internet. *Ann. Fam. Med.* 7 (5), 431–435.

Mohseni, M., Azami-Aghdash, S., Gareh Sheyklo, S., Moosavi, A., Nakhaee, M., Pournaghi-Azar, F., et al., 2018 Oct. Prevalence and reasons of self-medication in pregnant women: A systematic review and meta-analysis. *Int. J. Community Based Nurs. Midwifery* 6 (4), 272–284.

Montastruc, J.L., Bondon-Guitton, E., Abadie, D., Lacroix, I., Berreni, A., Pugnet, G., et al., 2016 Apr 1. Pharmacovigilance, risks and adverse effects of self-medication. *Therapies* 71 (2), 257–262.

Rothman, K.F., Pochi, P.E., 1988 Sep. Use of oral and topical agents for acne in pregnancy. *J. Am. Acad. Dermatol.* 19 (3), 431–442.

Ruiz, M.E., 2010 Oct. Risks of self-medication practices. *Curr. Drug Saf.* 5 (4), 315–323.

Sachdeva, P., Patel, B.G., Patel, B.K., 2009. Drug use in pregnancy; a point to ponder! *Indian J. Pharm. Sci.* 71 (1), 1–7.

Sambakunsi, C.S., Småbrekke, L., Varga, C.A., Solomon, V., Mponda, J.S., 2019 Dec. Knowledge, attitudes and practices related to self-medication with antimicrobials in Lilongwe, Malawi. *Malawi Med. J. J. Med. Assoc. Malawi* 31 (4), 225–232.

- Tawfik, A.G., Abdelaziz, A.I., Omran, M., Rabie, K.A., Ahmed, A.S.F., Abou-Ali, A., 2021 Aug. Assessment of community pharmacy management towards self-medication requests of tetracyclines for pregnant women: a simulated client study in upper Egypt. *Int. J. Clin. Pharm.* 43 (4), 969–979.
- Walling, A.D., 2006 Sep 15. Antibiotic use during pregnancy and lactation. *Am. Fam. Physician* 74 (6), 1035.
- Wolters Kluwer | Lexicomp [Internet]. [cited 2023 Dec 7]. Available from: https://go.wolterskluwer.com/the-global-innovation-of-lexicomp.html?utm_source=google&utm_medium=cpc&utm_campaign=ALL_Lexicomp_NAM_Micromedex&utm_content=002-ETA-Micromedex_Phase&utm_term=micromedex&gad_source=1&gclid=CjwKCAiA1MCrBhAoEiwAC2d64UZGtvvTPe6zJB9Yz5m_uqFixj11bRe9WeTLo9_BV-rfvvnEOKNB8xoCyt8QAvD_BwE.

- Yusuff, K.B., Omarusehe, L.D., 2011 Oct. Determinants of self medication practices among pregnant women in Ibadan, Nigeria. *Int. J. Clin. Pharm.* 33 (5), 868–875.
- Zawahir, S., Lekamwasam, S., Aslani, P., 2019 May. Antibiotic dispensing practice in community pharmacies: A simulated client study. *Res. Soc. Adm. Pharm. RSAP*. 15 (5), 584–590.