ABSTRACT
Antibiotic resistance (ABR) is a major growing global issue. The WHO report points out high proportions of resistance to common bacterial infections in all regions of the world. Common factors associated with resistance include non-adherence to the prescribed course, improper way of disposing the antibiotics (ABs), misuse and abuse, overdose, and underuse of antibiotics. Another contributing factor for the increase in antibiotic resistance is self-medication with antibiotics. This has caused many infectious diseases to be untreatable. Community pharmacists act as primary source of healthcare information providers to whom the patient directly seeks medical advices. Thus, they can play a central role in ensuring the safer use of antibiotics in the community.

Keywords: Antibiotics, Antibiotic resistance, Community pharmacists.

INTRODUCTION
Community pharmacies are privately owned pharmacies which are managed by licensed pharmacists to dispense the prescribed medicine [1]. Community pharmacies are integral to healthcare systems playing significant roles in medicine provision, primary prevention, patient education, and lifestyle advice [2]. Certain infectious diseases are self-limiting and thus there is no use for an antibiotic treatment [3]. Dispensing antibiotics without a prescription is a very common practice in community pharmacies [4]. Many community pharmacists ignore the legal guidelines for antibiotics dispensing by making them available in the counter without a prescription. A lack of proper knowledge on the use and disposal of antibiotics is a major threat in developing countries [5]. Antibiotic resistance (ABR) reduces the clinical efficacy causing many infectious diseases to become untreatable with antibiotics [5]. According to the World Health Organization (WHO) report on ABR, only 33 out of 133 countries surveyed had a national action plan to combat ABR [6,7]. ABR alone has been approximated to cause around ten million deaths worldwide [8]. ABR is a serious threat to global public health making infections harder to treat and increasing the risk of morbidity, mortality, and economic burden [9]. Because patients directly seek their guidance, community pharmacists play a critical role in maintaining the safe use of antibiotics in the community [10].

ANTIBIOTICS AND ANTIBIOTIC RESISTANCE (ABR)
Antibiotics are prescription drugs to fight bacterial infections [11]. An antibiotic kills the bacteria quickly by physical disruption of cell membranes [12]. Proper disease diagnosis and the rational selection of antibiotics is crucial [3]. When symptoms have only been present for two days, or less treatment is generally not recommended as certain bacterial infections are self-limiting [13]. Antibiotic use has increased by 36% globally between 2000 and 2010 in countries including Brazil, Russia, India, China, and South Africa [14,15]. According to a recent WHO multi-country survey, 93% of people self-medicate with antibiotics obtained from a community pharmacy [16]. Self-medication with antibiotics is frequent in most countries, and it is one of the factors contributing to the rise in antibiotic resistance (ABR) [17-19]. Antibiotic-resistant bacteria are highly prevalent in community and hospitals [20,21]. The other contributing factors to this are lack of proper knowledge on the use, disposal, and non-adherence to antibiotics [22]. ABR is a critical issue of concern both in developing and developed countries, making it a global issue [23-27]. A single bacterium resistant to more than one antibiotic is known as Multidrug-resistant (MDR). Multidrug-resistant patterns in bacteria have resulted in difficult to treat or untreatable [28]. In Southern Asia, multidrug resistance is projected to cause 96,000 deaths [29]. All these increase treatment complexity, healthcare costs, length of hospital stay, morbidity and mortality, side effects [1,30-33].

COMMUNITY PHARMACY AND PHARMACIST
A community pharmacy is a professional word that is also known as a medical store, a retail pharmacy, or a medical shop [3,34]. A community pharmacy is a medical establishment tasked with supplying and promoting the best pharmaceuticals, pharmacy services, and goods to the general people [35]. It should aim the welfare of the patient as its prime concern, rather than aiming at maximum sales and profit [6]. Community pharmacists have a central role in providing healthcare information and to supervise the dispensing of antibiotics with prescriptions to ensure rational use [6,36,37]. Advise the patients about correct application of ABs, the importance of intake regularity, interactions, possible adverse events, importance and consequences of AB misuse, and the basics of resistance [2,37,38]. Barriers mentioned included a lack of suitable counseling space, a lack of demand, and the expectation of a negative response from clients [39]. The rates of antibiotic resistance can be much reduced by community pharmacist by avoiding the illegal dispensing of antibiotics [40].

ANTIBIOTICS DISPENSING BEHAVIOUR
The sale of antibiotics without medical prescription has been observed in many countries [41-43]. Globally 62% of antibiotics dispensed in community pharmacy do not have a prescription [9,44,45]. The increase in antibiotic resistance has been frequently linked to unrestrained antibiotic dispensing [46]. The major factors contributing to the irrational use of antibiotics and increasing the rate of antimicrobial resistance is dispensing them without a proper prescription [1,47-49]. To dispense of antibiotics at community pharmacies may be influenced by pharmacists’ attitudes, lack of knowledge, and awareness about ABR [47,50,51]. The pharmacist dispenses antibiotics to patient on a direct request for minor infections as they consider antibiotics an effective agent for infection [5,52]. Dispensing antibiotics for viral infection without a proper prescription is also not less common [52]. Antibiotics are dispensed without a prescription, which is one of the key reasons contributing to irrational antibiotic usage and resistance [1].
Denny and Karan

Asian J Pharm Clin Res, Vol 14, Issue 9, 2021, 37-39

Antibiotic sales in the outpatient setting account for almost two-thirds of global antibiotic sales [13]. Patients may be at danger of self-medicating with antibiotics due to pharmacy employee behavior [53]. Saudi Arabia, China, Nigeria, Spain, and several European countries demonstrated the common practice of dispensing antibiotics without prescription [31,54-56].

ANTIBIOTICS KNOWLEDGE AND FACTORS CONTRIBUTING FOR DISPENSING WITHOUT PRESCRIPTION

Community pharmacists knowledge about antibiotics and resistance have a significant impact on their dispensing practice [57-59]. Those with three to four years of experience knew more about how to use medications correctly than those with nine to ten years of experience [4,41,42]. ABR could be a major factor affecting the illegal and inappropriate supply of antibiotics to patients with mild diseases at community pharmacies because to a lack of information about antibiotics [30]. As a result, continuing education at regular intervals is essential to keep pharmacists up to date and improve their knowledge of antibiotic use. Creating awareness about antibiotics and ABR in society will be another fine step in promoting the rational use of antibiotics [6]. Dispensing of antibiotics without prescription is releasing a wrong message to patients and encouraging them to continue obtaining antibiotics without a proper valid prescription [1].

Many other factors encourage the pharmacists to ignore the rules and regulations for antibiotics dispensing without prescription and are: On patient's direct request, for minor infections, lack of time for clinical visits, Previous treatment experience, having antibiotics at home regular customer, Promotions from pharmaceutical companies, poor public healthcare services, saving cost, familiarity with such antibiotics, doctor's clinic is not available, cost of doctor's consultation, poverty, incorrect self-diagnosis [1,5,60,61]. According to the findings of the majority of studies, pharmacists have a good attitude toward antimicrobial stewardship (AMS), with a high percentage of agreement of the majority of studies, pharmacists have a good attitude toward antimicrobial stewardship programs: A cross-sectional study from North Eastern China. Expert Rev Anti Infect Ther 2020;19:529-36.

Funding

CONFLICT OF INTERESTS

All authors have contributed equally.

AUTHOR CONTRIBUTIONS

Declared none.

REFERENCES

1. Alkadhimi A, Dawood O, Hassali M. Dispensing of antibiotics in community pharmacy in Iraq: A qualitative study. Pharm Pract 2020;18:2095.
2. Gajdács M, Paulik E, Szabó A. Knowledge, Attitude and practice of community pharmacists regarding antibiotic use and infectious diseases: A cross-sectional survey in hungary (KAPPhA-HU). Antibiotics 2020;9:41.
3. Ansari M. Evaluation of community pharmacies regarding dispensing practices of antibiotics in two districts of central Nepal. PLoS One 2017;12:e0183907.
4. Zahreddine L, Hallit S, Shakaroun S, Al-Hajie A, Awada S, Lahoud N. Knowledge of pharmacists and parents towards antibiotic use in pediatrics: A cross-sectional study in Lebanon. Pharm Pract 2018;16:1194.
5. Napolitano F, Polla GD, De Simone C, Lambiase C, Pelullo C, Angelillo I. The knowledge, attitudes, and practices of community pharmacists in their approach to antibiotic use: A nationwide survey in Italy. Antibiotics 2019;8:177.
6. Poyongo B, Sangodaf R. Pharmacists' knowledge, attitude and practice regarding the dispensing of antibiotics without prescription in Tanzania: An explorative cross-sectional study. Pharmacy 2020;8:238.
7. Feng Z, Hayat K, Huang Z, Shi L, Li P, Xiang C, et al. Knowledge, attitude, and practices of community pharmacy staff toward antimicrobial stewardship programs: A cross-sectional study from North Eastern China. Expert Rev Anti Infect Ther 2020;19:529-36.
8. Waseem H, Ali J, Sarfarw K, Khan A, Rehman H, Choudri M, et al. Assessment of knowledge and attitude trends towards antimicrobial resistance (AMR) among the community members, pharmacists/ pharmacy owners and physicians in district Sialkot, Pakistan. Antimicrob Resist Infect Control 2019;8:67.
9. Abubakar U, Tangiisuran B. Knowledge and practices of community pharmacists towards non-prescription dispensing of antibiotics in Northern Nigeria. Int J Clin Pharm 2020;42:756-64.
10. Hadi M, Karami N, Al-Muwalid Al, Al-Orabbi A, Al-Subah B, Bironnen A, et al. Community pharmacists’ knowledge, attitude, and practices towards dispensing antibiotics without prescription (DAwP): A cross-sectional survey in Makkah Province, Saudi Arabia. Int J Infect Dis 2016;47:95-100.
11. Dantas G, Sommer M, Oluwasegun R, Church G. Bacteria subsisting on antibiotics. Science 2008;320:100-3.
12. Hancock R. Peptide antibiotics. Lancet 1997;349:418-22.
13. Volpato D, Souza B, Rosa LD, Melo L, Daudt C, Deboni J. Use of antibiotics without medical prescription. Braz J Infect Dis 2005;9:288-91.
14. Zawahir MS. Pharmacists’ Provision and public’s use of antibiotics for common infections in Sri Lanka. Sydney: University of Sydney; 2020.
15. Siltrakool B, Berrou I, Griffiths D, Alghamdi S. Antibiotics’ use in Thailand. Community pharmacists’ knowledge, attitudes and practices. Antibiotics 2021;10:137.
16. Chang J, Ye D, Lv B, Jiang M, Zhu S, Yan K, et al. Sale of antibiotics without a prescription at community pharmacies in urban China: A multicentre cross-sectional survey. J Antimicrob Chemother 2018;72:1235-42.
17. Llor C, Cots J. The sale of antibiotics without prescription in pharmacies in Catalonia, Spain. Clin Infect Dis 2009;48:1345-9.
18. Kummerer K. Significance of antibiotics in the environment. J Antimicrobial Chemother 2003;52:317.
19. Mann J. Antibiotics: Actions, origins, resistance. Nat Prod Rep 2005;22:304.
20. Fischbach M, Walsh C. Antibiotics for emerging pathogens. Science 2009;325:1089-93.
21. Davies J, Davies D. Origins and evolution of antibiotic resistance. Microbiol Mol Biol Rev 2010;74:417-33.
22. Okeke I, Lamikanra A, Edelman R. Socioeconomic and behavioral factors leading to acquired bacterial resistance to antibiotics in developing countries. Emerg Infect Dis 1999;5:18-27.
23. Khan F, Khan F, Hayat K, Ahmad T, Khan A, Chang J, et al. Knowledge, attitude, and practice on antibiotics and its resistance: A two-phase mixed-methods online study among pakistani community pharmacists to promote rational antibiotic use. Int J Environ Res Public Health 2021;18:1320.
24. Sakeema M, Bennett A, McLachlan A. Enhancing pharmacists’ role in developing countries to overcome the challenge of antimicrobial resistance: A narrative review. Antimicrob Resist Infect Control 2018;7:63.
25. McCullough A, Parekh S, Rathbone J, Del Mar C, Hoffmann T. A systematic review of the public’s knowledge and beliefs about antibiotic resistance. J Antimicrob Chemother 2015;71:27-33.
26. Muloi D, Trevi E, Bettridge J, Rono R, Ongare D, Hassell J, et al. A cross sectional survey of practice and knowledge among antibiotics retailers in Nairobi, Kenya. J Glob Health 2019;9:010412.
27. Peterson G, Wu M, Bergin J. Pharmacists’ attitudes towards dispensing errors: Their causes and prevention. J Clin Pharm Ther 1999;24:57-71.
28. Frieri M, Kumar K, Boutin A. Antibiotic resistance. J Infect Public Health 2017;10:369-78.
29. Khan M, Hassali M, Ahmad A, Elkalmi R, Zaidi S, Dhingra S. Perceptions and practices of community pharmacists towards antimicrobial stewardship in the state of Selangor, Malaysia. PLoS One 2016;11:e0149623.
30. Zawahir S, Lekamwasam S, Aslani P. A cross-sectional national survey of community pharmacy staff: Knowledge and antibiotic provision. PLoS One 2019;14:e0215484.
31. Bin Abdulhak A, Al Tannir M, Almansor M, Almohaya M, Onazi A, Marei M, et al. Non prescribed sale of antibiotics in Riyadh, Saudi Arabia: A cross sectional study. BMC Public Health 2011;11:538.
32. Plachouras D, Kavatha D, Antoniadou A, Giannitsiotis E, Poulakou G, Kanellakopoulou K, et al. Dispensing of antibiotics without prescription: A cross-sectional survey in Greece, 2008: Another link in the antibiotic resistance chain. Euro Surveill 2010;15:19488.
33. Haddadin R, Alsous M, Wazairy M, Tahaineh L. Evaluation of antibiotic dispensing practice in community pharmacies in Jordan: A cross sectional study. PLoS One 2019;14:e0216175.
34. Moullin J, Sabater-Hernández D, Fernandez-Llimos F, Benrimo S. Defining professional pharmacy services in community pharmacy. Res Soc Adm Pharm 2013;9:989-95.
35. Hawksworth G, Corlett A, Wright DJ, Chrystyn H. Clinical pharmacy interventions by community pharmacists during the dispensing process. Br J Clin Pharmacol 1999;47:695-700.
36. Anderson C. Health promotion in community pharmacy: The UK situation. Patient Educ Couns 2000;39:285-91.
37. Alrasheedy A, Alsaloum M, Almuqbil F, Almuzaini M, Aba Alkhayl B, Alibshri A, et al. The impact of law enforcement on dispensing antibiotics without prescription: A multi-methods study from Saudi Arabia. Expert Rev Anti Infect Ther 2019;18:87-97.
38. Weller T. The expanding role of the antibiotic pharmacist. J Antimicrob Chemother 2014;69:549-58.
39. Eades C, Ferguson J, O’Carroll R. Public health in community pharmacy: A systematic review of pharmacist and consumer views. BMC Public Health 2011;11:582.
40. Roque F, Soares S, Breitenfeld L, López-Durán A, Figueiras A, Herdeiro M. Antibiotic stewardship in community pharmacists to antibiotic dispensing and microbial resistance: A qualitative study in Portugal. Int J Clin Pharm 2013;35:417-24.
41. Tang K, Teoh T, Ooi T, Khor W, Ong S, Lim P, et al. Public hospital pharmacists’ perceptions and knowledge of antibiotic use and resistance: A multicenter survey. Antibiotics 2020;9:311.
42. Bahta M, Tesfamariam S, Woldemariam D, Yemane H, Tesfamariam E, Alem T, et al. Dispensing of antibiotics without prescription and associated factors in drug retail outlets of Eritrea: A simulated client study. PLoS One 2020;15:e0228013.
43. Akinyandenu O, Akinyandenu A. Irrational use and non-prescription sale of antibiotics in Nigeria, a need for change. J Glob Antimicrob Resist 2018;13:240-5.
44. Sarwar M, Saqib A, Iftikhar S, Sadiq T. Knowledge of community pharmacists about antibiotics, and their perceptions and practices regarding antimicrobial stewardship: A cross-sectional study in Punjab, Pakistan. Infect Drug Resist 2018;11:133-45.
45. AlRukban M, AlRuthia Y, Almasoud M, Al-Owardhi M, Alsuauan A, Alrabiah A, et al. Community pharmacists’ views of the enforced antibiotics dispensing law and its impact on oral antibiotics sales in Saudi Arabia. Risk Manag Healthc Policy 2020;13:2899-907.
46. AlMohamadi A, Bhatti A, Bin Mahfouz L, Samargandi D, Al Abdal A. Dispensing medications without prescription at Saudi community pharmacy: Extent and perception. Saudi Pharm J 2013;21:13-8.
47. El-Din MZ, Samy F, Mohamed A, Handy F, Yasser S, Elhab M. Egyptian community pharmacists’ attitudes and practices towards antibiotic dispensing and antibiotic resistance; a cross-sectional survey in Greater Cairo. Curr Med Res Opin 2018;35:939-46.
48. Hoxha I, Malaj A, Kraja B, Bino S, Oluka M, Marković-Pekoš V, et al. Are pharmacists’ good knowledge and awareness on antibiotics taken for granted? The situation in Albania and future implications across countries. J Glob Antimicrob Resist 2018;13:240-5.
49. Sabry N, Farid S, Dawoud D. Antibiotic dispensing in Egyptian community pharmacies: An observational study. Res Soc Adm Pharm 2014;10:168-84.
50. Zapata-Cachafeiro M, González-González C, Vázquez-Lago J, López-Vázquez P, López-Durán A, Smyth E, et al. Determinants of antibiotic dispensing without a medical prescription: A cross-sectional study in the North of Spain. J Antimicrob Chemother 2014;69:3156-60.
51. Mahmood M, Alkhaeefi M, Sheikh A, Aljadhey H. Community pharmacists perspectives about reasons behind antibiotics dispensing without prescription: A qualitative study. Biomed Res 2018;29:2095.
52. Saradamma R, Higginbotham N, Nicholson M. Social factors influencing the acquisition of antibiotics without prescription in Kerala State, south India. Soc Sci Med 2000;50:891-903.
53. Atif M, Asghar S, Mushlang I, Malik I. Community pharmacists as antibiotic stewards: A qualitative study exploring the current status of antibiotic stewardship program in Bahawalpur, Pakistan. J Infect Public Health 2020;13:118-24.