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Nonprescription antimicrobial use during the COVID-19 pandemic: a systematic review

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Abstract

Purpose: Restrictions on mobility, confusion of information, and the lack of scientific evidence related to the treatment of COVID-19 have implications for the emergence of self-medication behavior in the community, especially the use of antimicrobials without a prescription. This study aims to describe the pattern of non-prescription antimicrobial use during the COVID-19 pandemic. **Methods:** A systematic review was conducted on articles published between 2020-2022 from 3 databases: Embase, Scopus, and Science Direct, examining the use of over-the-counter antimicrobials during the COVID-19 pandemic. **Results:** 13 relevant studies reviewed usage patterns, including self-medication behavior and antimicrobial dispensing practices without a prescription. **Conclusion:** The panic during the COVID-19 pandemic triggered the over-the-counter use of antimicrobials without a prescription, both as an effort to prevent and reduce symptoms. The role of community pharmacists and the government is urgently needed to overcome this.

Keywords: self-medication; without prescription; antibiotics; COVID-19

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INTRODUCTION

Antimicrobial resistance (AMR) is one of the top ten global health challenges [1]. Experts estimate that there have been 4.95 million AMR-related deaths, with 1.27 million specifically caused by antimicrobial resistance [2]. Apart from threatening the health sector, AMR also impacts various sectors, including the economic sector and the achievement of SDGs. The World Bank estimates that AMR will cause a global 3.8% reduction in annualized GDP by 2050 [3]. The incidence of AMR is projected to increase rapidly, especially in developing countries (LMIC). For example, about 40-60% of infections in Indonesia are caused by drug-resistant bacteria, compared to an average of 17% in OECD countries [4]. AMR also has the potential to disrupt the achievement of national development targets in disease control (TB, HIV/AIDS, and malaria), food security, and national health security. Governments should make comprehensive strategies to prevent silent pandemics in the future.

Abuse and overuse, major risk factors for AMR, occur in health facilities and society. Antimicrobial resistance occurs when bacteria, viruses, fungi, and parasites no longer respond to therapy, making infections more difficult to treat and increasing the risk of disease spread, severity, and death. Antibiotics are frequently used irrationally in society, although they cannot be used for self-medication and must be administered by a pharmacist based on a doctor's prescription. Given this, it is crucial that the sale of antimicrobials without a prescription is controlled more aggressively to prevent the inappropriate use of antibiotics and other antimicrobials. A number of studies have found that several factors contribute to the dispensing of antibiotics without a prescription,

including poor regulation enforcement, low awareness and understanding of antimicrobial resistance (AMR), high consumer demand for antibiotics, insufficient staff for dispensing medication, competition among pharmacies, and commercial pressure on pharmacy personnel [5–7].

A meta-analysis estimated the proportion of the total supply of antibiotics without a prescription globally was 62%, partly due to patient requests and community pharmacy staff recommendations[8]. In Indonesia, the results of drug management mapping by The Indonesian Food and Drug Administration (BPOM) in 2018 found that out of 176 pharmacies in 5 provinces, 83.52% of pharmacies dispensed antibiotics without a doctor's prescription. The results of antibiotic profiling from the Antimicrobial Resistance Control study by BPOM in 2019 on dispensing antibiotics without a prescription at pharmacies showed a prevalence rate of 13-33% [9]. From the above data, the practice of dispensing antibiotics without a prescription is still relatively high. The COVID-19 pandemic has exacerbated this condition [10]. Confusion of information causes price volatility and stock shortages of antibiotics, triggering panic buying and self-medication which further increases the potential for antimicrobial resistance [11].

METHODS

Search Strategy. For this systematic review, searches used three databases (Embase, Scopus, and Science Direct). This research was conducted on articles published in English between 2020 to 2022 with the keywords “over the counter” or “non-prescribed” combined with “antimicrobial resistance” and “COVID-19”. The articles obtained were then filtered by excluding paid articles not in English, articles with incomplete text, and articles with irrelevant titles and abstracts.

From the search results of 3 databases: Embase, Scopus, and Science Direct, 153 full-text articles were obtained, published from 2020 to 2022. Furthermore, relevant titles and abstracts were filtered and tested for eligibility to obtain 13 articles. This paper reviews the use of non-prescription antimicrobials during the COVID-19 pandemic based on these 13 articles.

RESULTS

The articles extracted and reviewed in this study focused on using non-prescription antimicrobials in the context of the COVID-19 pandemic. The review identified 13 relevant studies to elucidate antimicrobial usage patterns, including self-medication behavior and dispensing practices of antimicrobials without a prescription.

This review helped to enhance the accuracy and reliability of the findings, providing valuable insights into the trends and patterns of antimicrobial usage across different regions. The studies analyzed in this review were conducted in various parts of the globe, encompassing different continents, such as Asia (n=7), Africa (n=2), Europe (n=2), and America (n=2). Notably, a larger number of studies originated from Middle Eastern countries.

Two studies utilized different methodologies to monitor and measure the consumption of antimicrobials during the pandemic. One of the studies analyzed sales data from pharmacies [14], while the other study employed wastewater-based epidemiology [12] to identify and quantify the increase in the usage of these drugs. It is worth noting that these two approaches provide complementary perspectives on the patterns and trends of antimicrobial usage during the COVID-19 pandemic.

Furthermore, many studies included in this systematic review exposed that using antimicrobials during the COVID-19 pandemic was prevalent as a prophylactic measure [18,20], or as a self-medication practice for alleviating mild symptoms [19-23]. Unfortunately, such practices have the potential to exacerbate the severity of diseases and increase the rates of multidrug resistance [23]. Additionally, two studies adopted simulated patients (SPs) as part of their research methodology, providing further insight into selling antimicrobials without a prescription in privately owned pharmacies. These studies highlighted that selling antimicrobials without a prescription was common, and pharmacist assistants were frequently involved, often without proper counseling [15,16]. It is worth noting that such unwarranted and imprudent use of antimicrobials can lead to the emergence of drug-resistant bacteria, posing a significant threat to public health.

Moreover, an article found that Community pharmacists (CPs) had good knowledge about antimicrobial stewardship in Saudi Arabia [17]. On the contrary, two articles reported inadequate knowledge and perceptions regarding the proper use of antibiotics among healthcare professionals, medical students, and adults in the community, emphasizing the need to implement antimicrobial stewardship (AMS) programs to limit the unwarranted and imprudent usage of antimicrobials [24,25]. It is essential to prioritize implementing AMS programs to promote the proper use of antimicrobials and limit the risk of antimicrobial resistance.

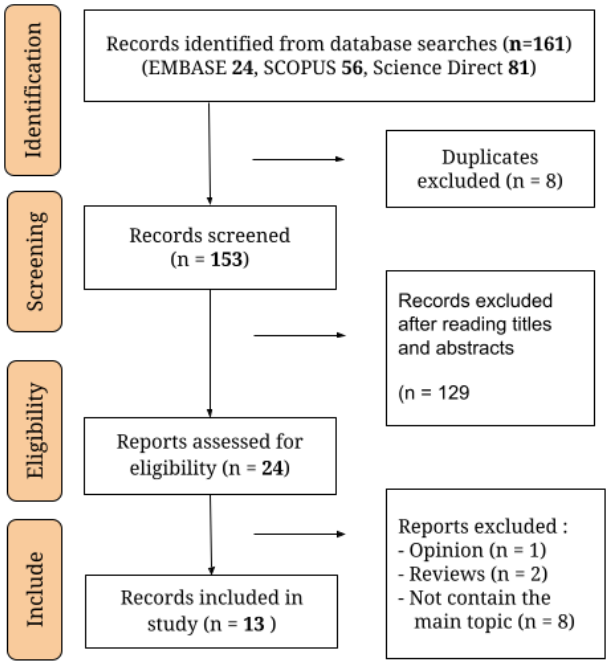

Figure 1. Prism Diagram

Table 1. Research Summary

Researcher (Year)	Country	Main topic
Adhikari (2022)	USA	AMU
Nguyen (2022)	Vietnam	Dispensing practice and customer knowledge
Mokwele (2021)	South Africa	The over-the-counter sale
Khojah (2022)	Saudi Arabia	The over-the-counter sale
Haseeb (2022)	Saudi Arabia	KAP
Jirjees (2022)	Algeria, Egypt, Iraq, Lebanon, Libya, Tunisia, and UAE	AMU
Banda (2021)	Zambia	Self-medication
Margolin (2021)	USA	Self-medication
Makowska (2020)	Polandia	Self-medication
Sen Tunc (2021)	Turkey	Self-medication
Bogdan (2022)	Romania	Self-medication
Alsayed (2022)	Jordan	KAP
Mashuri (2022)	Indonesia	KAP

AMU = Antimicrobial Use; **KAP:** knowledge, practices, and attitudes; **UAE:** the United Arab Emirates.

DISCUSSION

Antimicrobial use trends

The COVID-19 pandemic has triggered an increasing trend of antimicrobial use in society. Efforts to prevent the COVID-19 virus as a background for clean and healthy living behaviors have significantly caused changes in people's behavior in using over-the-counter antimicrobial-containing personal care products. A study in Arizona explained a trend shift using antimicrobials through wastewater sampling that examined found that paraben concentrations, especially methyl parabens, in wastewater during the pandemic were higher than in pre-pandemic data[12]. Methyl parabens are commonly used in personal care products such as soaps and cleaning products. In addition, the study also found that triclosan (TCS) and triclocarban (TCC) concentrations decreased during the pandemic. This condition results from the FDA's 2017 ban on products containing these antiseptic ingredients, which are considered not to have proven effectiveness and safety. Unfortunately, this antimicrobial content is still often found in antiseptic products circulating in Indonesia [13].

The majority of antibiotic purchases in Vietnam are made without a prescription. A national survey in Vietnam shows that over 80% of patients who buy antibiotics do not have a prescription. That condition is related to the low awareness of the law and low knowledge of rational antibiotic treatment [14]. The type of pharmacy ownership influences the unrestricted sale of antimicrobials in the community. An observational study in South Africa found that private (individually owned) pharmacies sold most antimicrobials without a prescription. The involvement of the pharmacist assistant and the lack of counseling worsened this matter [15]. In the era of the COVID-19 pandemic, pharmacist skills in triaging suspected COVID-19 and educating and counseling patients are essential in using antimicrobials [16]. Policymakers must emphasize the role of pharmacists and community assistants through information enrichment related to patient care under applicable rules and regulations. In addition, electronic monitoring of antimicrobial expenditure is necessary for a comprehensive evaluation. Indeed, the Food and Drug Authorities and the Ministry of Health are vital in limiting the sale of antimicrobials without a prescription in community pharmacies [17].

Self-medication

The COVID-19 pandemic has caused healthcare facilities worldwide to be unable to serve all infected patients. Confusion of information, high death rates,

and the degree of severity of symptoms cause most people to self-medicate at home. Antibiotics are the most widely consumed therapy as a precaution against COVID-19 [18].

Self-medication behavior is using drugs without a doctor's advice and prescription. The COVID-19 pandemic has multiplied this behavior even more. Apart from the long queues at the health facilities and limited time for treatment [19]. Effective alleviation modalities are urgently needed to reduce the disease's spread, symptoms, and severity. Besides having severe side effects and dangers, self-medication reduces healthcare costs and allows health workers to concentrate on emergency cases [19,20]. The study conducted in Poland showed that almost half of the 1013 respondents indicated that they self-medicated during the lockdown by using drugs for preventive measures and prescription drugs without consultation. Worries about health conditions and financial futures influence this behavior [21]. COVID-19 substantially affects a person's mental health, and psychological discomfort related to perceived health problems is likely one of the main reasons for self-medicating antibiotics during the COVID-19 pandemic.

Regarding children's dental problems, it is important to note that they can occur due to self-medication behavior which is a common practice in the time of covid19. Many as 38.1% of parents took self-medication to deal with their children's dental problems due to limited health services during the pandemic. Therefore, new services such as teledentistry must be developed as a solution [22].

Self-medication with over-the-counter antimicrobials has a high risk of worsening health conditions. A study in Romania found a high level of multi-drug resistance in those who self-medicate with antibiotics. Over-the-counter antibiotics are also a risk factor that causes prolonged hospitalization [23]. The susceptibility of antimicrobial resistance to those who consume over-the-counter antibiotics have implications for high morbidity and mortality which will also impact health financing.

Knowledge, attitude, and practice (KAP)

Misuse or overuse of antimicrobials is a crucial problem. In addition to health education factors, this is influenced by psychosocial characteristics such as behavior and attitudes. Research on health workers, health students, and the community in Jordan showed unsatisfactory results related to knowledge and perceptions about the proper use of antibiotics. This gap in perception and knowledge needs to be accommodated by promoting the rational use of antimicrobials through a comprehensive antimicrobial stewardship program [24].

Community pharmacists are essential in tackling COVID-19 in Indonesia by reducing the burden on healthcare facilities by providing medicines and counseling. A survey conducted in Indonesia reported that more than half of respondents had limited knowledge about COVID-19, and about a third admitted that they had sold antibiotics to clients suspected of having COVID-19. To support efforts to deal with COVID-19, most of them provide information by distributing leaflets and participating in surveillance activities [25].

Administration of over-the-counter antibiotics without a prescription is common in Indonesia. During the COVID-19 pandemic, there was an increased demand for Azithromycin. This situation may be because it is mentioned explicitly in the guidelines for managing patients with COVID-19 [26]. Although most patients with COVID-19 also do not have a bacterial infection and therefore do not need any antibiotics. Thus, the rational use of antibiotics is a big challenge in dealing with new pandemics in the future.

CONCLUSION

The COVID-19 pandemic is expected to exacerbate antimicrobial resistance (AMR) worldwide. Restrictions on mobility and lockdowns in various countries limited the capacity of health service facilities, some of whose resources are focused on handling COVID-19, have caused a significant shock to the economic sector and health infrastructure. This situation resulted in health services being unable to run as they should. Confusion of information and the lack of scientific evidence related to the treatment of COVID-19 has implications for the emergence of self-medication behavior in society, especially antimicrobials. Lack of awareness and knowledge regarding the rational use of antimicrobials leads to misuse and overuse. The panic that occurred during the COVID-19 pandemic triggered the unrestricted use of antimicrobials both as an effort to prevent and reduce symptoms. The community pharmacist's role is urgently needed as the spearhead of pharmaceutical services in providing counseling, information, and education to the community regarding rational treatment and controlling the sale of antimicrobials without a prescription. Besides that, the government's active role in strengthening regulations, supervisory measures, and imposing sanctions is urgently needed to overcome this.

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