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REVIEW

Self-medication and self-treatment with short-term antibiotics in Asian countries: A literature review

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Abstract

Introduction: The general public plays a role in the increase and spread of antimicrobial resistance by seeking self-medication with antibiotics. **Aim**: The purpose of this systematic review is to evaluate the prevalence of self-medication with short-term antibiotics in Asian countries. **Method**: A literature search was performed on Google Scholar, PubMed, and Science Direct databases in 2013-2020. **Results**: A total of 36 articles were included for full review and data extraction. The prevalence of self-medication with antibiotics in the articles reviewed was 50.8%. The main source of antibiotics without a prescription is from community pharmacies. The practice of self-medication with antibiotics is influenced by multifactor. **Conclusion**: Self-medication with antibiotics is a very common practice in Asian countries, contributing to the emergence of antimicrobial resistance which is no longer a threat but a terrible reality. This review provides an overview of the need for solutions to reduce self-medication with antibiotics behaviour in the community.

Introduction

The world is experiencing an epidemiological transition where the trend of non-communicable diseases tends to increase along with changes in people's life behaviour. However, the problem of communicable diseases cannot be completely resolved. One of the biggest threats to global health is the uncontrolled spread of epidemics due to highly pathogenic infectious diseases, especially those that easily cross borders and have the potential to endanger communities and their economies (WHO, 2015).

Antibiotics are the most commonly purchased drugs worldwide. The overuse, underuse, or misuse of antibiotics becomes a global issue that causes negative impacts. Antimicrobial resistance (AMR) results in the wastage of scarce resources and widespread health hazards. It is very critical health, social, and economic problem worldwide. Due to the clinical and socio-economic impacts of AMR, a strategy and action plan based on national efforts and international cooperation are needed to control and prevent AMR (Song, 2014).

Antibiotic resistance is perhaps the greatest threat facing the world in the field of infectious diseases, where it has the potential to cause greater death than cancer. The WHO report states that globally, the mortality rate due to antibiotic resistance in 2013 was 700,000/year, and it is predicted that in 2050 the mortality rate due to antibiotic resistance will be 10,000,000/year. The cumulative risk of economic expenditure is 100 billion USD/66 billion GBP. The direct and indirect impacts of antibiotic resistance will be felt in low-middle income countries in the Southeast Asia region. Every year, of the 14 million deaths that

occur in the Southeast Asia region, six million or about 40% are caused by infectious diseases, which also contribute to 42% of the loss of disability-adjusted life years. This burden requires urgent action to tackle antibiotic resistance, mitigating economic and health costs (WHO, 2016).

Half of all drugs are inappropriately prescribed, dispensed, or sold worldwide. Medicines are often used incorrectly, where 50% of all patients fail to take the drug and adhere to its therapy rationally. Irrational use of drugs is a major problem worldwide (Fresle, Hardon & Hodgkin, 2004). Self-medicated practice refers to the use of drugs to treat complaints of self-diagnosed disease without consulting a medical practitioner and without medical supervision. Weaknesses in health care systems, especially in developing countries, such as unfair distribution, high costs, limited access, lack of professional health care, unregulated distribution of drugs, and patient attitudes towards doctors, are some of the main drivers of self-medicated behaviour (Bhatta & Nepal, 2018).

In addition, it is widely shown that excessive use of antibiotics at the population level is an important risk factor for increased antibiotic resistance. Because patients do not know about antibiotics and are confused about their role, they must be told that most common infections do not require antibiotics and that these drugs can actually be dangerous. Antibiotic abuse that is prevalent in the community reinforces the importance of conducting research to develop effective strategies to stem the tide of antibiotic resistance (Singh, 2017). The objective of this literature search was to evaluate the prevalence and determinants of self-medication with antibiotics in Asian countries.

Methods

Search strategy

A literature search was performed on Google Scholar, PubMed, and Science Direct databases in 2013-2020. The search included a combination of "self-medication" OR "self-treatment" AND "antibiotics" AND "country where the study was conducted". The search was limited to peer-reviewed articles and reviews published in English. Search results from each database were exported to Microsoft Excel, merged, and sorted for removal of duplicate citations.

Study selection

Studies published in English are included in the review if they aim to assess the behaviour of self-medication with antibiotics in Asian countries. Studies on antiviral, antifungal, antiprotozoal, and topical antimicrobials are excluded. Original researches, research reports, case studies, and association reports were included for review. Abstract only articles, article reviews, editorials, systematic reviews, critical analysis, and narrative overviews were excluded. Articles were considered to be relevant based on the identification of self-medication with short-term antibiotics. Full-text articles were assessed for inclusion, and reasons were documented for all excluded papers.

Data extraction

Articles reporting community behaviour towards self-medication with short-term antibiotics were selected. Differences were resolved through discussion between authors. The authors excluded long-term antibiotics from this review, such as tuberculosis and antimalarial treatment.

A standard data extraction form was used to collect the following information: authors, year of publication, the country where the study was conducted, sample size, population sampled, prevalence, disease symptoms, main reasons of behaviour, where the information was obtained, source of drugs, and choice of antibiotics.

A database search returned 192 publications for review. 148 full-text publication meets the requirements, 114 were excluded for reasons of duplicate records, review articles, irrelevant topics, time of publication, systematic review, the article is not detailed, data is not systematically displayed which did not meet the authors' research objectives. Two additional articles were added following reference screening. The results were 36 articles that met the inclusion criteria (See Figure I).

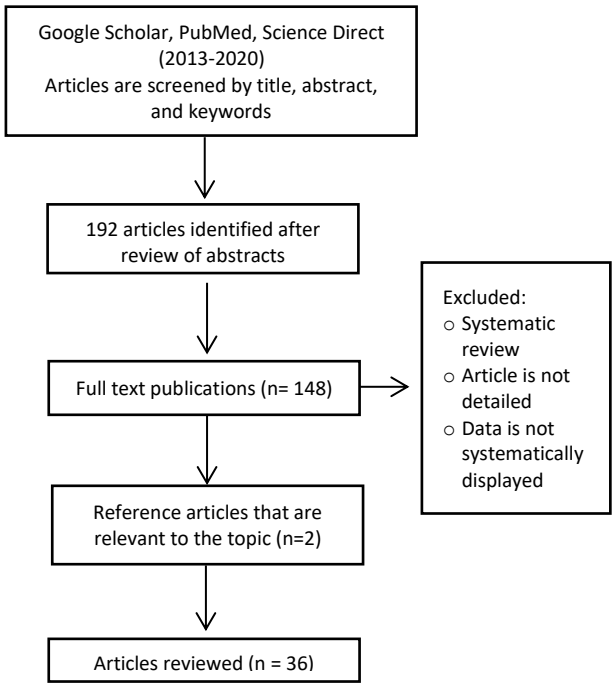

Figure 1: Flow chart of articles selection

Results

This study examined the prevalence of self-medication with short-term antibiotics from 29 countries out of a total of 48 Asian countries. Table I shows that there are 36 articles reporting on the main symptoms and the prevalence of self-medication with short-term antibiotics in Asian countries. The sample sizes ranged from 250 to 11,192 participants, and publication date ranged from 2013 to 2020; the sample population varies including the general public and other subgroup populations such as students (including medical and non-medical students); patients (attending pharmacies and other health facilities); age ≥ 18 years. The symptom categories reported to be various, and the symptoms most often treated with antibiotics were influenza or influenza-like syndromes. Prevalence (%) from the table means the percentage of the population that took part in self-medication with short-term antibiotics without consulting a medical doctor, i.e. using leftover antibiotics from previous treatments or getting antibiotics at the pharmacy without a prescription at a given time.

Table I: Articles reporting the prevalence of self-medication with short-term antibiotics usage in Asian countries

Authors, year	Countries	Sample Size	Population	Main Symptoms	Prevalence %
Barik, Islam, Kumar, &U. Haque, 2017	Bangladesh	4,100	Pharmacy patients	Fever, cold & cough, dysentery, diarrhoea and food poisoning, respiratory tract infection, UTI, toothache and viral disease	23.5
Biswas *et al*., 2014	Bangladesh	1,300	Pharmacy patients	Dysentery, diarrhoea, food poison, the common cold	26.69
Adhikari, Tshering, Tshokey, Wangmo, & Wangdi, 2017	Bhutan	692	General public	Common cold, any illness with fever	23.6
Prien, 2018	Cambodia	450	Outpatient of the referral hospital	Minor illness	49.4
Li, Lin, Wang, Xuan, & Zhou, 2018	China	11, 192	University student	Prophylaxis	63.1
Zhu *et al*., 2016	China	1,086	University students	Sore throat, fever, cough, runny nose	47.9
Manikandan, Muruganandhan, Priya, Shamsudeen, & Sujatha 2018	India		Dental clinic patients	Dental problems	71.2
Kapoor, Makhija, Nair, Nandigam, & Virmani 2017	India	531	Health science students	Sore throat, flu-like symptoms, skin infection	48
Kurniawan, Posangi, & Rampengan, 2017	Indonesia	400	Community health centre	Wound and skin infections	45
Widayati, 2013	Indonesia	559	Adults (household's survey)	Common-cold, cough, sore throat, headache, itching, toothache, fever	58
Ahmed, M, & Ali, 2019	Iraq	344	Pharmacy students	Headache, cough, and diarrhoea	62.79
Abedi, Dehghani, Emad, & Ghahramani, 2020	Iran	1,200	Outpatients of university dental clinics	Dental pain	42.6
Al Baz, Law, & Saadeh, 2018	Jordan	250	A refugee at health care	To cure or even prevent diseases	60
Yerubayev, 2019	Kazakhstan	472	General population	Cold, flu, sore throat, skin and wound infection,	63
Aboud & Awad, 2015	Kuwait	770	General population	Common cold, sore throat, cough, genitourinary infections, superficial wounds	27.5
Kitikannakorn & Phonlavong, 2018	Lao PDR	768	General population	Common cold, sore throat, and cough.	85

Authors, year	Countries	Sample Size	Population	Main Symptoms	Prevalence %
El-Kheir, Hanna, Mansour, Jamhour & Salameh, 2017	Lebanon	400	General population	Sore throat, common cold, fever	50
M. Haque *et al.*, 2019	Malaysia	649	University students	Runny nose, nasal congestion, cough, sore throat, fever, aches and pains, vomiting, diarrhoea, skin wounds	39.3
Kumar Sah, Kumar Jha, & Kumar Shah, 2016	Nepal	327	Nursing students	Common illness, save time and money	50
Shah *et al.*, 2014	Pakistan	431	Non-medical university students	Fever, pain relief, respiratory symptoms, gastrointestinal problems, urinary symptoms	47.6
Nazir & Azim, 2017	Pakistan	527	General population	Sore throat and flu	26
Gillani *et al.*, 2017	Pakistan	727	Non-medical university student	Gastrointestinal problems, pain relief, respiratory symptoms, fever, urinary problems	45
Abu Taha *et al*., 2016	Palestine	375	Adults	Cold, flu	38.7
Bulario, Cruz, Gutierrez & Pilapil, 2018	Philippines	390	Mothers of children < 18	Cough	42.05
Abdel-Rahman, Aljayyousi, El-Heneidy, Faisal & Kurdi, 2019	Qatar	596	University students	Previous illnesses that had similar symptoms	82 .
Alarifi, Alghadeer, Alhammad, Aljuaydi, & Babelghaith, 2018	Saudi Arabia	1,264	General population	Tonsillitis	34
Al Rasheed *et al*., 2016	Saudi Arabia	681	Adults	Cough, sore throat, common colds	78.7
Abdelrahman *et al.*, 2017	Saudi Arabia	1,028	Residents	Fever, common cold	37.9
Rathish *et al*., 2017	Sri Lanka	285	Medical students	Runny nose, flu	39
Al-kayali, & Haroun, 2017	Syria	436	Medical students	Headache, fever, and flu	60.5 40.9
Havanond, Hongsranagon, Pannoi, & Sirijoti, 2014	Thailand	396	Adults	Feeling unwell	33.84
Dönmez, Göv, & Güngör, 2018	Turkey	570	Nursing students	Colds and common cold, sore throat, toothache/swelling, fever, cough, stomach ache, weakness, hot urine, and skin infections	31.1
Abduelkarem *et al*., 2019	United Arab Emirates	315	General population	Sore throat, runny nose	31.7
Belkina *et al*., 2014	Saudi Arabia, Yemen, Uzbekistan	1,200	General education teachers	Cough and influenza	48.4 78.2 78.3
Ha, & Nguyen, 2019	Vietnam	1,000	Household survey (door to door survey in community)	Illness symptoms	83.3
Albawani, Abd-aziz, & Hassan, 2017	Yemen	363	Consumers attending community pharmacies	Cold, cough, diarrhoea, and fever	87.1

The authors also investigated the factors that influence self-medication with short-term antibiotic behaviour. Table II shows that 29 countries reported the main reasons for short-term antibiotic self-medication behaviour, source of information, source of where the drugs are purchased, and choice of antibiotics. When

exploring the data, not all of the studies the authors reviewed presented the percentage of choice of antibiotics for self-medication, and some studies did not present this data (N / A or data not available).

Table II: Main reasons, information from, sources, and choices of antibiotics

Studies	Main reasons	Information from	Sources	Choices of antibiotics
Bangladesh	Pre-experience, reduction of doctor's fees	Advice from traditional healers, own knowledge	Pharmacy	Azithromycin (24.3%) Metronidazole (12.3%) Ciprofloxacin (12.2%) Amoxicillin (9.2%) Cefixime (7.9%)
Bangladesh	Previous medication, other people's suggestions	Personal knowledge, past experience	Pharmacy	Metronidazole (50.43%) Azithromycin (20.75%) Ciprofloxacin (11.53%) Amoxicillin (10.37%) Tetracycline (7.49%)
Bhutan	Saving time and inconvenience of waiting in lines	Personal knowledge	Shared antibiotics; stock from previously used drugs,	Amoxicillin
Cambodia	Saving time, spending less money, living far from health facilities	Television, physician, radio, social network/ website, health care staffs, pharmacist, and newspaper	Pharmacy/ drug store	N/A
China	Success of previous treatment	Personal experience, health professional	Leftover, pharmacy, given by others	N/A
China	Convenience, cost saving, success of previous treatment	Personal experience, family member, pharmacist	Pharmacy, stock of previously used drugs	N/A
India	Success of previous prescription, availability of medicine, long waiting line in clinics, cost saving	Previous prescription, friends, family, internet, advertisements	Leftover, pharmacy	N/A
India	Success of previous prescription	Pharmacist	Pharmacy	B-lactams Fluoroquinolones Macrolides Tetracyclines
Indonesia	More practical way than seeking a doctor for a treatment, too busy to see a doctor, success of previous treatment, having not enough money to pay for the doctor visit	Old prescription	Pharmacy	Amoxycillin 68.3% Ampicillin 26.1%
Indonesia	Success of previous medication (54%)	Health professionals, friends/relatives, and drug leaflets.	Pharmacy, kiosks, drug stores	Amoxicillin Ampicillin Ciprofloxacin Tetracycline
Iraq	Quick relief desired, convenience, and avoiding waiting at clinics	Personal knowledge	Pharmacy	N/A
Iran	Severe pain, previous self-medications, and high costs of dental visits	Previous prescription	Pharmacy, leftover, family/ friends	Amoxicillin Metronidazole Cefixime Azithromycin Penicillin
Jordan	Long waiting hours of seeking medical advice	Medical advice	Pharmacy, leftover, share drugs	N/A
Kazakhstan	Success of previous medication	Medical advice, internet, friend/family	Pharmacy, leftover	N/A
Kuwait	Speedy recovery	Previous prescription, family/friends	Pharmacy, leftover, sharing with family	N/A
Lao PDR	Curing illness	Health care providers, relatives, television, radio and internet	Pharmacy	N/A

Studies	Main reasons	Information from	Sources	Choices of antibiotics
Lebanon, Beirut Tripoli	Curing illness	Health professional	Pharmacy	N/A
Malaysia	Cost saving and convenience	previous prescription	Pharmacy	Penicillin Doxycycline Clarithromycin
Nepal	Success of previous medication	Success of previous medication	Pharmacy	
Pakistan	Saving time and money, avoiding hassle of going to doctor, success of previous medication	Personal knowledge, old prescription	Pharmacy	Amoxicillin (41,4%) Metronidazole (30.5%) Ciprofloxacin (12.7%)
Pakistan	Success of previous medication	Previous experience, pharmacists, relatives/friends, doctors, leaflets	Pharmacy, leftover	Amoxiclav (40%) Ciprofloxacin (14%) Metronidazole (11%) Doxycycline (10%) Azithromycin (8%)
Pakistan	Saving time and money, avoiding hassle, success of previous treatment	Personal knowledge, friends, parents, pharmacist	Leftover, pharmacy	Metronidazole Ciprofloxacin Amoxicillin Co-Trimoxazole
Palestine	Preventing symptoms from getting worse	Doctors, pharmacists, friends/ relatives, websites, television.	Pharmacy, leftover, friends/ relatives	N/A
Philippines	Success of previous medication	Health centres and other sources	Pharmacy, health centres	Amoxicillin (50.25%)
Qatar	Success of previous medication	Pharmacist, old prescription	Pharmacy	N/A
Saudi Arabia	Success of previous medication	Previous doctor's prescription, advertisements from websites, social media, TV, or reading	Pharmacy	Amoxiclav (45.1%) Amoxicillin (39.9%)
Riyadh, Saudi	Curing symptoms	Friends, nearby pharmacy	Pharmacy	Amoxicillin Ciprofloxacin Penicillin
Saudi Arabia	Getting better more quickly	Physicians, pharmacists, friends/relatives	Pharmacy	N/A
Sri Lanka	Previous experience, no access to physician care	Previous knowledge, Physician, pharmacist, leaflet, relative/friend, internet	Pharmacy, relatives/ friends, households	Amoxicillin (56%)
Syria	Mildness of illness and time-saving	Pharmacist, previous doctor prescription, personal experience, friends' advice	Pharmacy, leftover of previous prescription	N/A
Thailand	Success of previous medication	Old packaging of antibiotics	Pharmacy	Amoxicillin
Turkey	Having no time to visit the doctor, success of previous medication, test fees, drug store and surrounding advice	Close friends and relatives	Maintained antibiotics at home, pharmacy	N/A
UAE	Previous experience with the disease	Previous personal experience, friend/relative, community pharmacist	Pharmacy, household.	Penicillins Macrolides Quinolones Cephalosporins Tetracyclines

Studies	Main reasons	Information from	Sources	Choices of antibiotics
Yemen, Saudi Arabia, Uzbekistan	Poor regulation, lack of access to health care, cultural beliefs	Pharmacist, friend, old prescription	Pharmacy	N/A
Vietnam	Believing in professional competences in buying antibiotics at drug store near home	health professional, family/friend	Pharmacy	N/A
Yemen	High cost of doctor consultation	Community drug dispenser, family member, personnel choice, old prescription, friends, media	Pharmacy	N/A

Discussion

This study shows that self-medication with short-term antibiotics behaviour is diverse in Asian countries (see Table I). Socio-demographic and economic factors have also been examined in some of these studies, providing information that the use of non-prescription antibiotics exists at all levels of socioeconomic status. However, the reasons for this behaviour, particularly those related to socio-cognitive or psychological factors, have not been explored. Therefore, more research is needed, especially the one focusing on these factors. This reinforces the importance of conducting research to develop effective strategies to stem the tide of antibiotic resistance.

Prevalence

The prevalence of self-medication with antibiotics (SMA) in this study was reported to be high, the lowest being 23.5% in Bangladesh (U. Haque *et al*., 2017) and the highest being 87.1% in Yemen (Albawani *et al*., 2017), with an average of 50.8%. Hence, this appears to be a health challenge in the region. This reinforces the results of health behaviour studies that are practised in most parts of the world, where more than 50% of antibiotics are purchased and used without a prescription (Morgan *et al*., 2011; Högberg, Muller, Monnet & Cars 2014; Auta *et al*., 2019).

The main reason for the large range of SMA prevalence may be due to differences in social, cultural, and economic status determinants. Differences are also caused by research methodology, research data collection, sample population, and time that might contribute to variations in the prevalence of SMA.

Socio-demographic and socio-economic factors

Most studies reported that the success of previous treatment influenced SMA, while other studies reported that low knowledge (Yerubayev, 2019); male gender (Emad *et al*., 2020); female gender (Zhu *et al*., 2016); age (Zhu *et al*., 2016); income (Abu Taha *et al*., 2016) were the ones influenced SMA. Other studies also reported that the level of education (Jamhour *et al*., 2017) and disease severity (Al-kayali & Haroun, 2017) were factors that were significantly related to SMA behaviour. In most studies, socio-cultural, economic, and demographic factors were reported to have an influence on the practice of self-medication with antibiotics. Older age groups were reportedly more likely to do SMA in China and Riyadh (Al Rasheed *et al*., 2016; Zhu *et al*., 2016), whereas in Tripoli (Lebanon), age did not have a significant effect (Jamhour *et al*., 2017). The effect of these factors is reported to be low or high depending on the research context. For example, studies in Palestine were reported to consider income with SMA practice (Abu Taha *et al*., 2016), while research in Yemen reported having no significant relationship with material status and monthly income (Albawani *et al*., 2017). Studies among people living in rural areas reported that factors, such as education level and socioeconomic status, were all related to self-medication (Phonlavong & Kitikannakorn, 2018). The study found how self-medicated participants had low levels of education, with almost half of them uneducated and most of them included in low socio-economic classes.

Information source, drug sources, and benefits of SMA

Information on antimicrobial agents on self-medication is obtained from a variety of sources. The majority of studies reported health workers, pharmacists, and family/friends/relatives as the main sources of information (see Table I). Other sources of information were the success of previous treatments (most studies), leaflets (Rathish *et al*., 2017), advertisements from websites, social media (Alghadeer *et al*., 2018), radio and television (Phonlavong & Kitikannakorn, 2018). Antibiotics were obtained from various sources, including pharmacies (all studies), leftovers (most studies), relatives/friends (most studies), and other health services. The advantages of self-medication with

antibiotics are that it is easy to get drugs at the pharmacies, saves money (Gillani *et al*., 2017) and time for doctor visits (Al-kayali & Haroun, 2017) and can cure symptoms (Al Rasheed *et al*., 2016). It turns out that the success of previous treatment, poor regulation, lack of access to health services, saving time or money are among the causes; similar findings are observed and reported worldwide (Lescure *et al.*, 2018).

Information and advice about antibiotics can come from common people (uninformed people). Several studies have shown that ordinary people, especially family members, relatives, or popular friends, can become the sources of information. Informal drug providers, such as traditional medicine traders and traditional healers, who are mostly not health workers, are also popular as drug advisers, especially in developing countries. The advice given by common people is mainly based on their experience in using antibiotics that are prescribed or not. This raises questions about the suitability and appropriateness of the advice given because their previous medical conditions may differ.

Health workers are expected to be able to provide education about medicine in a professional manner (Greiner & Knebel, 2003). The WHO states that pharmacists are health workers who have the responsibility to help people in their own treatment, including the use of antibiotics without a prescription, based on their knowledge of pharmaceutical care. Appropriate and consistent pharmaceutical services will increase the role and reputation of pharmacists in the wider community and can improve the health status of the community. In terms of time spent, pharmacists ideally prioritise providing pharmaceutical services, but there are often job conflicts as entrepreneurs who manage pharmacies with clinical pharmacy services neither reject nor question the reason for antibiotic use when requested (Hermansyah *et al.*, 2012). They tend to delay the client's idea of the need for antibiotics. Most pharmacy employees do not have professional qualifications and know very little about pharmacies. Pharmacists trained in integrated healthcare systems have had a significant impact on minimising irrational use of antibiotics in developing countries. The increasing role of pharmacists in developing countries has the potential to have a positive impact on global AMR issues (Gajdács, Paulik, & Szabó, 2020). Further research should be conducted to evaluate the attitudes and behaviours of healthcare practitioners towards antibiotic use.

Doctors also have a professional responsibility to provide information about medications, including the antibiotics prescribed for their patients. However, the excessive workload is often claimed as the main reason for not providing adequate information about the drugs prescribed to patients. Advice on the use of antibiotics given by common people or health workers can affect the behaviour of using antibiotics that are not prescribed in the community (Saqib *et al*., 2019). Therefore, this issue needs to be explored further.

Misuse of self-treatment antibiotics

The most common misuse of self-medication with antibiotics includes the inappropriate use of antibiotics for children, self-medication with antibiotics (Biswas *et al*., 2014), inappropriate duration of therapy of fewer than five days (Yerubayev, 2019), an incorrect indication that is used for viral infection (most studies), exchange/share of drugs (most studies), and wound healing (Kurniawan *et al*., 2017). The use of antimicrobials for viral infections, such as influenza and influenza-like symptoms, sore throat, and fever, was reported in nearly all studies. Other complaints reported were dysentery, diarrhoea, and food poisoning (Biswas *et al*., 2014; U. Haque *et al*., 2017). Antimicrobial agents commonly used for symptoms of viral infections included amoxicillin, ampicillin, metronidazole, azithromycin, ciprofloxacin, and tetracycline.

Several studies have shown a significant positive relationship between knowledge of antibiotics and antibiotic resistance and behaviour. Therefore, intervention studies are needed to educate the population. Because advice from medical personnel is positively related to knowledge and attitudes toward antibiotics, it is important to encourage medical staff to instruct patients. The study identified groups at high risk for poor antibiotic behaviour to increase the effectiveness of targeted interventions for reducing the abuse.

Key finding

Pharmacies are generally used as the main source of information for antibiotics that are obtained and used freely. However, community pharmacies often do not have adequate bio-medical knowledge about antimicrobial agents and disease processes. Therefore, a promotion at all levels of society is an important target for minimising SMA. The success of previous treatments tends to increase self-confidence in the ability to manage subsequent diseases without the need to consult a doctor. This is a potential risk factor for improper drug use because most patients do not have knowledge of the disease process and drugs used in self-medication. In the articles reviewed, side effects from SMA were rarely reported.

Recommendation

There is a need to develop more research (qualitative, quantitative, observational studies, prospective longitudinal studies, or retrospective studies) on factors affecting self-medication with antibiotics to optimally address public health problems. Some of the studies conducted in the majority of self-medication with antibiotics are cross-sectional, where several studies focus on knowledge, attitudes, and practices. Comprehensive qualitative research will have the benefit of increasing a deeper understanding of the phenomenon of self-medication with antibiotics. Therefore, randomised control trials (RCT) are recommended to explore the impact of self-medication with antibiotics on population groups. RCTs are essential for assessing the impact of self-medication with antibiotics on AMR to produce evidence that can guide the development of more effective health promotion strategies. Standard counselling protocols and policies regarding the prescribing and limiting of antibiotic release are important steps for controlling AMR.

Limitations

The limitations of this study are limited to the published literature, excluding potential results found in the "grey" literature.

Conclusions

Self-medication with antibiotics (SMA) is a very common practice in Asian countries. Self-medication with antibiotics is influenced by socio-cultural health factors and is often associated with poor spending and prescription practices. Self-medication with antibiotics practice is one of the most important factors contributing to the emergence of AMR, which is no longer a threat but a terrible reality.

This literature review provides an overview of the need for solutions to reduce SMA behaviour in the community, among others, by conducting pharmaceutical counselling, seminars, campaigns, pamphlets, and education through social media. Educational interventions targeting individuals and the community, in addition to increasing access to high-quality public health services and enforcement of regulations on the use of drugs without prescription, can also reduce the burden of infectious diseases and help reduce the challenges of SMA.

Conflict of interest

The authors have no conflict of interest associated with the material presented in this paper.

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Author contributions

Conceptualisation: IW, SB. Data curation: IW, SB. Formal analysis: IW, SB. Funding acquisition: None. Methodology: IW, SB. Project administration: IW. Writing original draft: IW, SB. Writing, review & editing: IW, SB, PJ, DP.

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