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Assessment of Knowledge, Attitude, and Practices Related to Antibiotic Dispensing and Resistance among Community Pharmacists in South India

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ABSTRACT

Objectives: The study aims to assess community pharmacists' comprehension of antibiotic resistance, investigate their perspectives on dispensing antibiotics, and examine the present practices of staff in prescribing antibiotics and patient education. It also studies the relationship between their knowledge, attitude, and behaviors.

Material and Methods: Between March 2023 and August 2023, 200 community pharmacists from various South Indian communities participated in an observational research study. A web-based poll administered via Google Forms was used to gather the data. Spearman rank correlation and narrative statistics were used in the statistical analysis and interpretation of the data.

Results: Most participants (56%) were aged 20–29 years, with 112 males and 88 females of the participants in this study. One hundred and seventy-eight had <5 years of experience. Analysis of pharmacist knowledge revealed misconceptions. It was observed that variables such as knowledge versus attitude correlations, had a positive significance ($P = 0.419$), whereas knowledge and practice ($P = 0.416$) and attitude and practice ($P = 0.399$) had a negative correlation.

Conclusion: The study highlights knowledge gaps, misconceptions, and variations in antibiotic dispensing practices among community pharmacists. The willingness of pharmacists to engage in responsible practices and their role in combating antibiotic resistance is evident. Targeted educational interventions and collaborative efforts are essential in handling and promoting responsible antibiotic use.

Keywords: Antibiotic, Antimicrobial resistance, Community pharmacist, Knowledge, attitude, and practice, Responsible antibiotic use

INTRODUCTION

Antibiotics are chemical agents that either kill bacteria or inhibit their growth. An antibiotic drug is a synthesized medicine used to treat bacterial infections.[1] The phrase "antimicrobial" refers to a large category of medications used to treat diseases caused by bacteria, viruses, fungi, and parasites, including those that treat malaria.[1] Antibiotic resistance refers to genetic changes in bacteria that diminish or eliminate the effectiveness of an antibiotic in destroying them.[2]

To stop the development and propagation of antimicrobial resistance, the World Health Organization is coordinating a worldwide initiative to educate the public, legislators, and professionals in the fields of agriculture and health about optimal practices.[3] Drug-resistant bacteria are accelerated by illicit drug use, overuse, and insufficient infection mitigation and management.[2] Particularly in the past century, reports of the worldwide spread of methicillin-resistant *Staphylococcus aureus*, robust isolates of *Streptococcus pneumoniae*, and resistant *Enterobacteriaceae*-particularly strains resistant to cephalosporins because they produce extended-spectrum beta-lactamases and carbapenems – have drawn significant attention to the issue of antibiotic-resistant bacteria.[4]

One of the biggest concerns to public health in the 21st century is bacterial antibiotic resistance, which happens when alterations in bacteria make medications intended for healing infection less potent.[5] Understanding the public's knowledge, attitudes, and practices (KAP) around antibiotic usage is critical to determining any training prerequisites and to help minimize the overuse and misuse of antibiotics. The public can play a significant role in this respect.[6] Community drugstore pharmacists typically give antibiotics despite the absence of a doctor's prescription because people cannot pay appointment charges.[7]

Resistance arises due to selective pressure on microbial communities, which leads to the selection of resistant strains.[8] Overuse of antibiotics bought from community drug stores without a prescription, particularly in developing nations, has been documented in certain studies.[9] As widespread, long-standing diseases coexist with newly emerging, drug-resistant microbes, there is a rapidly narrowing period of opportunity; taking no action now will result in no solution in the future.[10] Due to decades of misapplication and overuse of antibiotics, clinically important bacteria now exhibit resistance to numerous antibiotics and resistance to a single medication.[11]

MATERIAL AND METHODS

First, a longitudinal research study was conducted to evaluate pharmacy technicians in South India's KAP regarding dispensing antibiotics and resistance. The Institutional Review Board granted consent for the research (RIPER/IRB/PP/2022/011). The study was conducted in various communities across South India. This study took place from March 2023 to August 2023, spanning a period of 6 months. A total of 200 community pharmacists were included as participants in this study. Those who were not community pharmacists or who would not agree to participate in the poll were excluded from the study. A Google Forms-distributed online survey questionnaire was used to gather data.

Respondents were sent a link to a Google Form as part of the study methodology. Before accessing the digital poll, respondents had to indicate their interest in participating by selecting "yes" on platforms such as Facebook and WhatsApp.

Data sources

Sociodemographic information, including gender, age, level of education, years of experience, and location, was acquired for the study. To assess KAP, we created 24 questions across antibiotic dispensing practices.

Statistical analysis

Adequate statistical analyses were carried out on the survey information collected. Statistics were used to summarize the characteristics of the study participants and their responses to the survey questions. Inferential statistical methods, such as Spearman rank correlation analysis, were employed to find correlations and associations among variables. Descriptive statistical measures, such as percentage and year of experience, were used to condense sociodemographic data. The significance level (*P*-value) was set to decide the statistical significance of observed relationships.

RESULTS

The research project was carried out in South India during 6 months. The study involved a total of 200 participants. Out of the 200 participants, 112 were male and 88 were female. The majority of participants (172) among the 200 respondents were aged 20–29 years, 21 participants were aged 30–39, and 7 participants were aged 40–49. The majority of the participants (178) had <5 years [Table 1] of experience, 18 had 5-9 years and 4 had 10 or more than 10 years.

Table 2 describes the community pharmacist's understanding of the uses and side effects of antibiotics. Antibiotics are used to treat bacterial illnesses, according to 50% of pharmacists. Antibiotics are helpful for viral infections, according to 52%of respondents. Merely 11% strongly disagree that antibiotics have been demonstrated to alleviate pain and inflammation. About 54% concurred that antibiotics might eradicate the typical variety of bacteria in the intestines. Merely 7% concurred that antibiotics could result in a relapse with infection after eliminating the healthy bacteria in the gut. A mere 8% enthusiastically agreed that an adverse reaction could result from antibiotic use. When asked if taking antibiotics can be stopped before finishing an entire course of treatment if symptoms improve, 37% of the respondents thought that improperly using drugs can cause an antibiotic's sensitivity to a particular infection to decline. Among pharmacists, 28% were opposed to this observation.

Table 3 shows the pharmaceutical professionals' perspective on antimicrobial resistance. Sixty per cent of respondents felt that antimicrobial resistance had grown to be a serious health concern. The prescription medicine distribution is at risk: 61% concurred. Most people responded neutrally in strong, non-prescriptive terms. Awareness of antibiotic resistance: 60% agreed. Need for adequate training on antimicrobial use: 53% agreed. Antimicrobials have minimal impact: 58% agreed. Just 13% disagreed that doctors who write prescriptions are the only professionals in their line of work. About 54% concurred to playing a significant part in health initiatives that address the prevention of infections and the use of resistant antimicrobial agents.

Table 4 describes the pharmacy technicians' answers to the questions meant to evaluate how they dispense antibiotics. "I give antibiotics without a written authorization because I am aware that 22% of the patients did not oppose it. About 19% of patients firmly insisted that I dispense antibiotics for longer than the physician had recommended. About 53% of respondents agreed that I prescribe antibiotics. I check the prescribed antibiotics: 52% agreed. I request additional clinical info prior administering: 47% of respondents concurred. I dispense more antibiotics than prescribed:35% agreed. I participate in antimicrobial awareness campaigns:50% agreed. I educate the patient about anti-microbial resistance: 54% agreed.

Table 5 illustrates the relationship between the KAP of community pharmacy technicians. The relationship between attitude and knowledge was positively correlated. There was a negative association between knowledge and practice and attitude and practice ($P < 0.05$).

Table 1: The participants' basic characteristic (n=200).

Features	Quantity of participants *n* (%)
Range of age in years	
20–29	172 (86)
30–39	21 (10.5)
40–49	7 (3.5)
Gender	
Males	112 (56)
Females	88 (44)
Years of experience	
<5	178 (89)
5–9	18 (9)
10 or more	4 (2)

DISCUSSION

The primary purpose of the research was to assess community pharmacists in South India's KAP regarding antibiotic prescription and antimicrobial resistance. The findings provided insights into the KAP of community pharmacists in South India concerning antibiotic dispensing and resistance. Findings indicate a significant proportion of pharmacists have inadequate knowledge about antibiotics and their appropriate use.

About 52% of the respondents in our survey felt that antibiotics are helpful for infections with viruses, exposing a misperception that calls for focused education campaigns [Table 2]. On the other hand, more than two-thirds (70.5%) of 200 community pharmacy technicians in a research done by Hadi *et al.*[2] were ignorant that it is against the law to dispense antibiotics without a doctor's prescription. The number of antibiotics prescribed and teaching patients the

Table 2: Respondents' understanding of antibiotic use and susceptibility.

The inquiries K1 to K8	Strongly oppose *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Concur	Strongly concur *n* (%)	Median
K1-Infections caused by bacteria can be successfully treated with antimicrobial agents.	4 (2)	3 (2)	14 (7)	78 (39)	101 (50)	5
K2-Aantibiotics are not effective for treating viral infections.	27 (14)	37 (18)	13 (7)	103 (52)	20 (10)	4
K3-Antibiotics are not indicated for reducing pain or inflammation.	21 (11)	33 (17)	52 (26)	78 (39)	16 (8)	3
K4-Antibiotics can disrupt the usual microflora that exist within us.	4 (2)	16 (8)	57 (29)	107 (54)	16 (8)	4
K5-Antibiotics have the potential to cause subsequent infections by upsetting the natural balance of bacteria in our bodies.	3 (2)	37 (19)	63 (32)	82 (41)	15 (7)	3
K6-Antibiotics can trigger allergic reactions.	5 (3)	19 (9)	51 (26)	109 (54)	16 (8)	4
K7-Antibiotics that are improperly utilized may become less effective against a particular infection.	10 (5)	45 (23)	30 (15)	74 (37)	41 (20)	4
K8-It is crucial to finish the entire regimen of antibiotics as directed, even if manifestations subside before the prescribed duration is up.	49 (24)	55 (28)	21 (11)	63 (31)	12 (6)	2

Table 3: Respondent opinions regarding the use of antibiotics and susceptibility.

Inquiries A1 through A8	Strongly disagree *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Concur *n* (%)	Strongly concur *n* (%)	Median
A1-Antibiotic-resistant bacteria have become a serious public health issue.	2 (1)	8 (4)	16 (8)	120 (60)	54 (27)	4
A2-Antibacterial resistance may increase if drugs are dispensed without a doctor's authorization.	2 (1)	12 (6)	16 (8)	123 (61)	47 (24)	4
A3-Strict steps should be taken to restrict or stop the practice of providing medications despite a prescription if it leads to antimicrobial resistance.	2 (1)	10 (5)	72 (36)	69 (34)	47 (24)	4
A4-Since community drug stores can be important players in reducing antimicrobial resistance; it is imperative that they become more aware of the issue of antibiotic-resistance bacteria.	1 (1)	3 (2)	34 (17)	120 (60)	42 (21)	4
A5-Community pharmacists should receive adequate training on antimicrobial use.	1 (1)	6 (3)	48 (24)	106 (53)	39 (19)	4
A6-Individual efforts to use antimicrobials rationally have minimal impact on the overall anti-microbial resistance problems.	6 (3)	11 (5)	47 (24)	115 (58)	21 (10)	4
A7-I believe that understanding antimicrobial resistance is crucial not only for prescribing physicians but for all healthcare professionals.	13 (7)	27 (13)	48 (24)	91 (46)	21 (10)	4
A8-It is the duty of pharmacists to take a leading part in medical sector initiatives to combat antibiotic resistance and infection.	1 (1)	13 (6)	41 (20)	108 (54)	37 (19)	4

Table 4: The respondent's practice of giving antibiotics.

Inquiries P1 To P8	Strongly disagree *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Agree *n* (%)	Strongly agree *n* (%)	Median
P1-Since I am aware of whom to treat, I prescribe antibiotics lacking authorization at their explicit request.	25 (13)	45 (22)	26 (13)	92 (46)	12 (6)	3.5
P2-I provide antibiotics for an additional period than the physician recommended.	38 (19)	35 (17)	40 (20)	80 (40)	7 (4)	3
P3-I only provide antibiotics in a written order.	6 (3)	5 (2)	45 (23)	106 (53)	38 (19)	4
P4-Prior to giving them out, I make sure that the drugs are given for the right diseases.	6 (3)	8 (4)	41 (20)	103 (52)	42 (21)	4
P5-Prior to opting to give out antibiotics without a doctor's order, I get more medical data.	7 (4)	20 (10)	51 (25)	93 (47)	29 (28)	4
P6-At the consumer's inquiry, I administer antibiotics for an additional period beyond what the doctor recommended.	29 (14)	39 (20)	51 (25)	70 (35)	11 (6)	3
P7-I take part in antimicrobial education programs to encourage the wise use of antibiotics.	2 (1)	6 (3)	51 (25)	99 (50)	42 (21)	4
P8-I inform the people I treat about resistance-related issues and the administration of antibiotics.	3 (2)	6 (3)	37 (18)	107 (54)	47 (23)	4

Table 5: The respondent's behaviors of prescribing antibiotics without a doctor's recommendation.

Variables	Correlation (r)	Significance (p)
Knowledge versus attitude	0.333	0.419
Knowledge versus practice	−0.335	0.416
Attitude versus practice	−0.347	0.399

At $P<0.05$, statistical significance

significance of sticking to and finishing the entire course of antibiotics were found to be correlated ($P = 0.007$) in this research.

In addition, our study revealed that 37% of pharmacists acknowledged the potential consequences of antibiotic misuse on sensitivity to specific pathogens, emphasizing the importance of raising awareness about completing full courses of treatment.

The attitude of pharmacists toward antibiotic resistance emerged as a significant concern in our study. While 60% concurred that the growing problem of antimicrobial resistance is detrimental to health [Table 3], there remains room for improvement in terms of providing adequate training on anti-microbial use (53% agreed).There is a limited understanding of the impact of antimicrobial agents (58% agreed). Moreover, our study found that 54% of pharmacists are willing to play a significant part in programs that address the prevention of infection and resistant antimicrobial agents, indicating a positive inclination toward actively addressing these critical issues. These findings are consistent with a study conducted by J. Taibah Univ,[13], which reported that some drugstore employees acknowledged giving out medicines without a written order. Pharmacists were more inclined to give antibiotics to patients who had already been prescribed the same medication (their frequent clients or families). However, most pharmacists did not perceive this practice as problematic for the patient's welfare.

The assessment of pharmacist's dispensing practices [Table 4] revealed some areas of concern, with 35% admitting to dispensing antibiotics beyond the prescribed duration. However, it is encouraging that 57% of pharmacists reported taking measures to prevent infection transmission and 54% educated patients about antimicrobial resistance. These findings indicate a willingness among pharmacists to promote responsible antibiotic dispensing practices and patient education.

In our investigation, we observed significant positive correlations between variables such as knowledge and attitude ($P = 0.419$), knowledge and practice ($P = 0.416$), and a negative correlation between attitude and practice ($P = 0.399$). These results are different from the research findings obtained by Gajdacs *et al*.,[14] which found that Hungarian pharmacists are aware of the effects of rising antimicrobial resistance on the community and have a sufficient understanding of antibiotics and antimicrobial regimens.

The results of our study regarding the correlations between KAP were $P < 0.05$, indicating statistical significance. Antibiotic distribution methods and usage could be substantially improved by educational strategies and interventions to resolve recognized inadequacies, change mindsets, and minimize resistance.

CONCLUSION

The study demonstrates community pharmacists' knowledge of antibiotic dispensing and resistance, highlighting their strong points and areas requiring development. While false beliefs and inadequate procedure exist, there is also a willingness among pharmacists to engage in initiatives aimed at addressing antibiotic resistance. The results highlight the significance of focused educational initiatives to dispel myths, promote responsible antibiotic dispensing practices, and bolster the pharmacist's role in combating antibiotic resistance. Collaborative efforts involving healthcare professionals, regulatory bodies, and educational institutions are crucial to achieving these objectives.

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Ethical approval

The research/study approved by the Institutional Review Board at Raghavendra Institute of Pharmaceutical Education and Research, number RIPER/IRB/PP/2022/011, dated December 15, 2022.

Declaration of patient consent

Patient's consent was not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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