Knowledge, Attitude, and Practice regarding the Rational Use of Antibiotics in Kerala

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***Abstract*—Background: As antibiotic resistance continues to rise globally, assessing the Knowledge, Attitude and Practice regarding the use of antibiotics and promoting their rationality will be a significant step towards preserving their effectiveness for future generations.**

Method: Cross sectional survey including 160 study subjects. It was conducted through self-structured questionnaires among populations in Kerala.

Result: Statistical analysis using Pearson correlation revealed significant positive associations between knowledge, attitude, and practice scores. Knowledge and practice were highly correlated ($r = 0.842$, $p < 0.01$), as were knowledge and attitude ($r = 0.566$, $p < 0.01$), and attitude and practice ($r = 0.626$, $p < 0.01$). These findings suggest that improvements in knowledge are closely linked to better attitudes and practices regarding antibiotic use.

Conclusion: The rational use of antibiotics is a shared responsibility requiring coordinated efforts at all levels of society. By translating these findings into action, Kerala can strengthen its position as a leader in healthcare and set a benchmark for other regions in India and beyond in the fight against antibiotic resistance.

***Index Terms*—Antibiotics, Resistance**

I. INTRODUCTION

Antibiotics are among the most significant medical advancements of the 20th century, revolutionizing the treatment of bacterial infections and saving millions of lives globally [1]. However, the effectiveness of these lifesaving drugs is now under severe threat due to the rapid emergence and spread of antibiotic resistance. Antibiotic resistance occurs when bacteria adapt to antibiotics, rendering them ineffective and leading to treatment failures [2]. It is recognized as a global health crisis, with the World Health Organization (WHO) identifying it as one of the top ten threats to public health. Factors contributing to this issue include the overuse and misuse of antibiotics, self-medication, over prescription, and the incomplete adherence to prescribed treatment regimens. Addressing these issues requires a robust understanding of how antibiotics are perceived and used by different populations, making studies on the knowledge, attitudes, and practices (KAP) surrounding antibiotics increasingly important [3].

The rational use of antibiotics is defined as ensuring that patients receive the correct medication, in appropriate doses, for the right duration, and only when medically necessary. Rational antibiotic use is essential to limit the development of resistance, reduce healthcare costs, and improve patient outcomes. Despite its importance, irrational practices are widespread [4]. These include taking antibiotics without prescriptions, using them for conditions such as viral infections where they are ineffective, and prematurely stopping treatment when symptoms subside. Globally, such practices are driven by a lack of awareness, easy access to antibiotics without prescriptions, and cultural misconceptions about their use [5].

Kerala, a state in southern India, presents a unique context for exploring the rational use of antibiotics. Known for its high literacy rates, advanced healthcare system, and better health outcomes compared to other Indian states, Kerala has often been a model for public health initiatives. However, the misuse of antibiotics remains a significant concern in the state [6]. Studies suggest that self-medication with antibiotics is common, and there is a lack of awareness among both the public and healthcare providers about the dangers of resistance. Additionally, cultural beliefs, ease of access to over-the-counter antibiotics, and pressures on physicians to prescribe antibiotics contribute to the problem. Addressing these issues requires a detailed understanding of how people in Kerala perceive and use antibiotics, as well as the factors influencing their behavior [7].

A Knowledge, Attitude, and Practice (KAP) study on the rational use of antibiotics in Kerala provides an essential tool to assess the awareness and behavior of the population regarding antibiotics and resistance [8]. KAP studies are widely used in public health research to identify gaps in knowledge, explore attitudes that shape behavior, and analyze real-world practices. In the context of antibiotic use, such a study can help uncover the extent to which people understand the consequences of misuse, their attitudes towards self-medication, and their adherence to prescribed treatments. Furthermore, it can provide insights into healthcare providers' prescribing patterns and their role in promoting the rational use of antibiotics [9,10].

The findings from a KAP study can serve as a foundation for designing targeted interventions to promote the rational use of antibiotics in Kerala. Public health campaigns, educational initiatives, and policy changes informed by such studies can play a critical role in addressing the gaps identified [11,12,13]. By fostering greater awareness and encouraging behavior change among both the public and healthcare providers, it is possible to curb the misuse of antibiotics and slow the spread of resistance.

As antibiotic resistance continues to rise globally, tackling this issue at the regional level is essential to contribute to national and international efforts [14]. The results of this study can not only benefit Kerala but also provide valuable lessons for other regions facing similar challenges. In a state renowned for its progressive healthcare system, addressing the misuse of antibiotics and promoting their rational use will be a significant step towards preserving their effectiveness for future generations [15].

II. MATERIALS AND METHODS

A random sampling method was used in the study. The state Kerala was the only focus for the data collection. Based on previous studies, the final sample size was 160. Survey was conducted among age group of 20 to 50 years in February to march 2025. The researcher obtained signed informed consent and explained the background of the study, the purpose, the principle of privacy and confidentiality and the precautions before conducting the survey. Inclusion criteria included 1. General population between the ages of 18-65. 2. Individuals willing to participate. The exclusion criteria were 1. Participants were failure to complete the questionnaire.2. Individuals not from Kerala.

The questionnaires (see Appendix) used for survey were self-structured and validated through expert panel. 14, 14 and 12 questions were included in the part of knowledge, attitude and practice respectively regarding the rational use of antibiotics in Kerala. All the data were entered in Microsoft spreadsheet and proper analysis were carried out using Pearson correlation. The study was conducted after protocol approval by Institutional Research committee of Ezhuthachan College of Pharmaceutical Sciences.

III. RESULTS

III a: Demographic Characteristics:

A total of 160 participants from Kerala were included in the study. The majority were aged between 20–29 years (77.5%), followed by participants aged less than 20 years (7.5%), 30–39 years (6.3%), 40–49 years (4.4%), and over 50 years (4.4%). Females comprised 66.9% of the sample, while males accounted for 33.1% as shown in Figure 1 and 2.

Figure 1: Age wise distribution

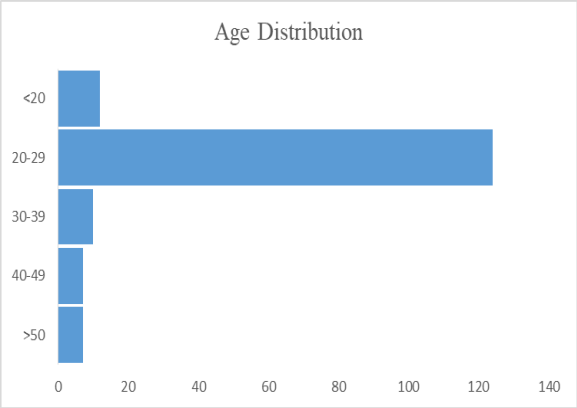
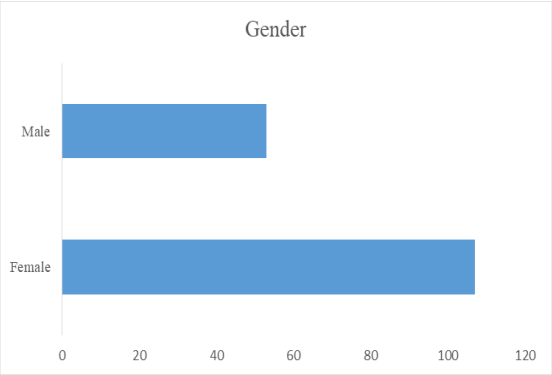


Figure 2: Gender wise distribution



III b: Knowledge

The knowledge section comprised 11 statements assessing participants' awareness of the proper use, risks, and disposal of antibiotics. Responses were graded on a five-point Likert scale: strongly agree, agree, neutral, disagree, and strongly disagree. The assessment of participants' knowledge regarding the rational use of antibiotics was quantified and categorized into three distinct levels: good, average, and poor. Out of the 160 participants surveyed, 63 (39.4%) were classified as having good knowledge, 34 (21.3%) demonstrated an average level of knowledge, while an equal number, 63 (39.4%), were found to have poor knowledge on the subject.

III c: Attitude

The attitude section consisted of 11 statements exploring the frequency of positive behaviors related to antibiotic use, using a five-point scale: always, often, sometimes, rarely, and never. The attitudes of participants toward the rational use of antibiotics were systematically evaluated and classified into three categories: good, average, and poor. Among the 160 respondents, 56 individuals (35.0%) exhibited a good attitude, characterized by consistent consultation with healthcare professionals, proper adherence to prescribed regimens, and proactive engagement in safe and responsible behaviors related to antibiotic use. The average attitude group comprised 58 participants (36.3%), reflecting moderate adherence to recommended practices, with occasional lapses such as infrequent consultation, inconsistent information-seeking behavior, or partial adherence to safe disposal practices. The poor attitude category included 46 individuals (28.8%), indicating a tendency towards risky behaviors, such as self-medication, neglect of expiry date checks, reluctance to inquire about side effects, and improper storage or disposal of antibiotics.

III d: Practice

The practice section included 11 statements evaluated on a five-point Likert scale from strongly agree to strongly disagree, capturing real-life actions and beliefs. The practical behaviours of participants concerning the use of antibiotics were categorized into three levels—good, average, and poor—based on their responses to key practice-related statements. Among the 160 participants, 60 individuals (37.5%) demonstrated good practice, consistently engaging in responsible actions such as completing prescribed courses, refraining from sharing or self-medicating with antibiotics, properly disposing of unused medications, and consulting healthcare professionals as needed.

A further 52 participants (32.5%) exhibited average practice. This group reflected moderate adherence to recommended behaviours, but with occasional lapses. Individuals in this category may sometimes retain leftover antibiotics, occasionally rely on non-professional advice, or be inconsistent in proper disposal, leaving them susceptible to risky practices despite partial awareness.

Notably, 48 participants (30.0%) were classified as having poor practice. This segment frequently engaged in inappropriate or risky behaviours, including sharing antibiotics, using leftover or non-prescribed antibiotics, discarding antibiotics improperly, or neglecting to seek professional guidance.

The distribution demonstrates that, although a substantial proportion of respondents are practicing rational antibiotic use, a combined 62.5% of the sample either falls short of consistent good practice or

routinely engages in practices that contribute to antibiotic misuse and resistance. The presence of nearly one-third in the poor practice category is particularly concerning, as these behaviours directly facilitate the spread of antibiotic resistance within the community

Table 1: Knowledge

Knowledge	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	No	%	No	%	No	%	No	%	No	%
1. I am aware of the proper use of Antibiotics	54	33.80	66	41.30	28	17.50	4	2.50	8	5.00
2. I know that Antibiotics can cause allergic reactions	51	31.90	78	48.80	15	9.40	10	6.30	6	3.80
3. I understand that Antibiotics are ineffective against viral infection	52	32.50	51	31.90	34	21.30	11	6.90	12	7.50
4. I know that overuse of Antibiotics can lead to drug resistance	72	45.00	61	38.10	15	9.40	12	7.50		
5. I am aware that Antibiotics can disrupt the balance of good bacteria in the body.	49	30.60	72	45.00	21	13.10	11	6.90	7	4.40
6. I know that it is important to complete the prescribed course of Antibiotics.	84	52.50	51	31.90	15	9.40	3	1.90	7	4.40
7. I understand that sharing Antibiotics with others is dangerous.	67	41.90	61	38.10	21	13.10	11	6.90		
8. I am aware that incorrect use of Antibiotics can lead to adverse health effects.	75	46.90	64	40.00	12	7.50	2	1.30	7	4.40
9. I understand that Antibiotics should only be taken when prescribed by a healthcare professional.	86	53.80	51	31.90	10	6.30	5	3.10	8	5.00
10. I know that proper disposal of leftover Antibiotics is important for safety.	77	48.10	52	32.50	16	10.00	4	2.50	11	6.90
11. I am aware of the risks associated with self-medication using Antibiotics.	59	36.90	79	49.40	12	7.50	1	0.60	9	5.60

Table 2: Attitude

Attitude	Always		Often		Sometimes		Rarely		Never	
	No	%	No	%	No	%	No	%	No	%
1. I consult a doctor before starting an Antibiotic.	93	58.10	23	14.40	23	14.40	7	4.40	14	8.80
2. I check the expiry date of Antibiotics before using them	120	75.00	11	6.90	8	5.00	8	8.00	13	8.10
3. I take Antibiotics exactly as prescribed by my healthcare provider.	101	63.10	23	14.40	23	14.40	5	31.00	8	5.00
4. I discard leftover Antibiotics instead of keeping them for future use.	73	45.60	24	15.00	31	19.40	15	9.40	17	10.60

5. I ask my healthcare provider about the potential side effects of Antibiotics before starting them.	64	40.00	36	22.50	32	20.00	9	5.60	19	11.90
6. I try to educate others about the correct use of Antibiotics.	64	40.00	31	19.40	33	20.60	17	10.60	15	9.40
7. I keep a record of the Antibiotics I have taken in the past year.	30	18.80	10	6.30	34	21.30	33	20.60	53	33.10
8. I dispose of expired or unused Antibiotics properly.	84	52.50	18	11.30	24	15.00	15	9.40	19	11.90
9. I read the information leaflet that comes with Antibiotics before taking them.	59	36.90	25	15.60	36	22.50	18	11.30	22	13.80
10. I never taken Antibiotics based on the information gained from internet.	65	40.60	17	10.60	23	14.40	8	5.00	47	29.40
11. I never throw the left over or expired Antibiotics into the garbage	53	33.10	18	11.30	41	25.60	18	11.30	30	18.80

Table 3: Practice

Practice	Strogly agree		Agree		Neutral		Disagree		Strongly disagree	
	No	%	No	%	No	%	No	%	No	%
1. I think it is not acceptable to share Antibiotics with friends or family if they have similar symptoms.	55	34.40	67	41.90	15	9.40	14	8.80	9	5.60
2. I believe that completing the full course of Antibiotics is essential, even if I feel better before finishing them	64	40.00	66	41.30	14	8.80	7	4.40	9	5.60
3. I think that it is not okay to take leftover Antibiotics from a previous prescription.	59	36.90	62	38.80	19	11.90	11	6.90	9	5.60
4. I believe that the use of Antibiotics should be restricted to serious bacterial infections.	31	19.40	62	38.80	41	25.60	17	10.60	9	5.60
5. I think that more public awareness is needed to educate people about Antibiotic resistance.	86	53.80	52	32.50	12	7.50	3	1.90	7	4.40
6. I feel that over-the-counter availability of Antibiotics is not a good practice.	41	25.60	68	42.50	37	23.10	6	3.80	8	5.00
7. I believe that doctors should not prescribe Antibiotics more frequently to ensure effective treatment.	45	28.10	64	40.00	30	18.80	11	6.90	10	6.30
8. I think that taking Antibiotics for viral infections is not acceptable.	40	25.00	54	33.80	43	26.90	13	8.10	10	6.30
9. I believe that I don't have sufficient knowledge to make informed decisions about Antibiotic use.	27	16.90	61	38.10	41	25.60	20	12.50	11	6.90
10. I think that the government should implement strict regulations on the sale and distribution of Antibiotics.	58	36.30	71	44.40	17	10.60	6	3.80	8	5.00

11. I feel confident discussing Antibiotic usage with healthcare professionals.	44	27.50	79	49.40	24	15.00	4	2.50	9	5.60

Table 4: Pearson correlation

		Practice	Knowledge	Attitude
Practice	Pearson Correlation	1	.842**	.626**
	Sig. (2-tailed)		.000	.000
	N	160	160	160
Knowledge	Pearson Correlation	.842**	1	.566**
	Sig. (2-tailed)	.000		.000
	N	160	160	160
Attitude	Pearson Correlation	.626**	.566**	1
	Sig. (2-tailed)	.000	.000	
	N	160	160	160
**. Correlation is significant at the 0.01 level (2-tailed).				

IV. DISCISSION

The demographic profile indicated a predominantly young and female sample. While a notable proportion of participants demonstrated good knowledge of antibiotics—including awareness of antibiotic resistance, the need to complete prescribed courses, and the dangers of self-medication—an equally large segment was classified as having poor knowledge, particularly regarding the ineffectiveness of antibiotics against viral infections and the importance of proper disposal. Attitude scores reflected a similar trend: only about one-third showed a consistently positive outlook, while the majority fell into average or poor categories, highlighting the persistence of risky perceptions and occasional disregard for best practices.

In terms of practice, just over a third of respondents consistently engaged in rational antibiotic use, such as not sharing antibiotics, completing the prescribed course, and consulting healthcare professionals. However, a significant proportion still engaged in potentially harmful behaviors, including retaining leftover antibiotics, improper disposal, and self-medication.

Importantly, the analysis demonstrated strong positive correlations between knowledge, attitude, and practice scores. This suggests that individuals with higher levels of knowledge are more likely to exhibit positive attitudes and rational practices, emphasizing the central role of education and awareness in promoting safe antibiotic use.

V. CONCLUSION

The results of this study underscore the urgent need for targeted public health interventions to improve the rational use of antibiotics within the community. While Kerala is often cited for its advanced health indicators, the persistence of knowledge gaps, variable attitudes, and unsafe practices signals ongoing vulnerabilities in antibiotic stewardship. Comprehensive educational initiatives, strengthened regulatory policies, and community engagement are essential to address these challenges. Efforts should focus particularly on those with poor or average KAP scores, with special emphasis on correcting misconceptions, encouraging responsible behaviors, and highlighting the broader public health implications of antibiotic misuse.

In conclusion, fostering a culture of rational antibiotic use is not only vital for individual health but also crucial for combating the growing threat of antibiotic resistance. The findings from this study provide valuable insights for healthcare policymakers, educators, and practitioners, paving the way for evidence-based strategies to preserve antibiotic efficacy for future generations.

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