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Knowledge and Practices Regarding Antibiotic Resistance and Self-Medication among Adults in Rural Wayanad, Kerala: A Cross-Sectional Study

Prof. Priya Sany[1], Mrs. Sajna V.S[2], Mrs. Nimmy Peter[3], Fathima Safa K. M[4] Fathimath Shahala[5], Fidha Sherin T. M[6], Gayathri Sajikumar[7], Gopika R. Chandran[8], Muhammed Elaan[9], Muhammed Hassan[10], Dora P. Anil[11]

[1]Professor, Department of Medical Surgical Nursing, Dr Moopen's Nursing College, Wayanad, Kerala, India.
[2]Assistant Professor, Department of Obstetrics and Gynaecology Nursing, Dr. Moopen's Nursing College, Wayanad, Kerala, India.
[3]Clinical Instructor, Department of Medical and Surgical Nursing, Dr Moopen's Nursing College, Wayanad, Kerala, India.
[4,5,6,7,8,9,10,11]Undergraduate Students, Department of Nursing, Dr Moopen's Nursing College, Wayanad, Kerala, India.

Abstract

Background: Inappropriate antibiotic use and self-medication contribute to antimicrobial resistance and remain important community-health concerns. This study assessed knowledge and practices regarding antibiotic resistance and self-medication among adults in selected rural areas of Wayanad, Kerala.

Methods: A quantitative cross-sectional study was conducted among 118 adults aged 18–60 years selected by non-probability convenience sampling. Data were collected using a self-structured questionnaire comprising 15 knowledge items and 15 practice items, together with demographic and antibiotic-use characteristics. Data were summarized using descriptive statistics; associations were examined using the non-parametric analyses reported in the thesis, and the relationship between knowledge and practice scores was assessed using Spearman's rank correlation.

Results: Most participants had average knowledge (86/118, 72.9%), followed by good knowledge (24/118, 20.3%) and poor knowledge (8/118, 6.8%). Practice scores were classified as average for 67 participants (56.8%), good for 49 (41.5%), and poor for 2 (1.7%). Fever (57.6%), cough (35.6%), and pain (34.7%) were the most frequently reported conditions associated with self-medication. Practice scores were significantly associated with age ($p=0.001$), gender ($p=0.026$), educational status ($p<0.001$), occupation ($p=0.029$), monthly family income ($p=0.034$), type of health facility accessed ($p=0.009$), and antibiotic use during the preceding 6 months ($p<0.001$). Knowledge and practice scores showed a weak negative correlation (Spearman's $r=-0.25$, $p=0.006$).

Conclusion: Adults in the selected rural areas predominantly demonstrated average knowledge and average practice scores. Community-focused education and practical measures supporting appropriate antibiotic use may help address unsafe self-medication.

Keywords: antibiotic resistance; antimicrobial resistance; self-medication; antibiotics; knowledge; practices; rural health; Wayanad

Introduction

Antimicrobial resistance (AMR) is a major public health threat because infections caused by resistant organisms can become more difficult to treat and can compromise routine medical care. The World Health Organization reported that approximately one in six laboratory-confirmed bacterial infections causing common infections worldwide in 2023 were resistant to antibiotic treatment, while resistance increased in more than 40% of monitored pathogen–antibiotic combinations between 2018 and 2023.[1] Wayanad was selected as the study setting because of its predominantly rural population. According to the 2011 Census, approximately 96.1% of Wayanad's population lived in rural areas, making it a relevant setting to assess knowledge and self-medication practices regarding antibiotic resistance among adults in rural communities.

Self-medication is one component of inappropriate antibiotic use. Systematic reviews have shown that antimicrobial self-medication is common in low- and middle-income settings, while antibiotics are also frequently supplied without prescriptions in community pharmacies.[2,3]

Community knowledge and behaviour are relevant to antimicrobial stewardship. Indian community-based research has identified misconceptions about antibiotic action and resistance despite relatively appropriate attitudes toward prescription-only use.[5] Other cross-sectional studies have demonstrated associations between self-medication and factors such as previous antibiotic use, education, and healthcare access.[6,7]

The present study assessed knowledge and practices regarding antibiotic resistance and self-medication among adults in selected rural areas of Wayanad, Kerala, and examined their association with selected demographic and antibiotic-use characteristics.

Methods

Study design and setting

A quantitative, cross-sectional study was conducted among adults residing in selected rural areas of Wayanad district, Kerala.

Participants and sampling

The study included 118 adults aged 18–60 years who could understand Malayalam or English and were willing to participate. Healthcare professionals were excluded. Participants were selected using non-probability convenience sampling. The minimum sample size was estimated using the single-population-proportion formula: $n = Z^2(1-\alpha/2) \times p(1-p) / d^2$. Based on the proportion of adequate knowledge reported by Aravind et al. ($p = 0.54$), a 95% confidence level ($Z = 1.96$), and an absolute precision of 0.09 ($d = 0.09$), the calculation was $n = (1.96)^2 \times 0.54 \times 0.46 / (0.09)^2 = 117.7$, rounded up to 118 participants.

Eligibility criteria

Inclusion criteria were adults aged 18–60 years, able to understand Malayalam or English, and willing to participate. Healthcare professionals were excluded.

Study variables

Independent variables included age, gender, educational status, occupation, marital status, monthly family income, common conditions for self-medication, source of information for medicines, type of health facility usually accessed, and history of antibiotic use during the previous six months. Dependent variables

were knowledge regarding antibiotic resistance and self-medication and self-medication practices related to antibiotic use.

Data collection instrument

A self-structured questionnaire was developed using the investigators' experience, literature review, and expert discussion. Section A covered demographic and antibiotic-use characteristics. Section B contained 15 knowledge questions, with one mark for each correct response. Section C contained 15 practice questions scored on a five-point frequency scale from 0 to 4. Knowledge scores ranged from 0–15 and were classified as poor (0–5), average (6–10), and good (11–15). Practice scores ranged from 0–60 and were classified as good (0–20), average (21–40), and poor (41–60), with higher scores interpreted as poorer practice

Pilot testing and ethics

A pilot study was conducted among 12 adults from the rural study area. Institutional ethical approval was obtained from the Institutional Ethics Committee of Dr. Moopen's Medical College and Hospital, and informed consent was obtained from participants.

Data analysis

Data were analysed using Jamovi. Frequencies and percentages were used for categorical variables. Associations were examined using the non-parametric analyses reported in the thesis. Spearman's rank correlation was used to assess the relationship between knowledge and practice scores. A p value <0.05 was considered statistically significant.

Results

Sociodemographic characteristics

Table 1. Sociodemographic characteristics of the participants (n = 118)

SL NO	Variable	Category	Frequency, n (%)
1	Age (years)	18–30	23 (19.5)
		31–40	23 (19.5)
		41–50	39 (33.1)
		51–60	33 (28.0)
2	Gender	Female	80 (67.8)
		Male	38 (32.2)
3	Educational status	Primary	11 (9.3)
		Secondary	44 (37.3)
		Higher secondary	27 (22.9)
		Degree	36 (30.5)
4	Occupation	Employed	57 (48.3)
		Unemployed	61 (51.7)
5	Marital status	Married	105 (89.0)
		Unmarried	13 (11.0)
6	Monthly family income (₹)	0–30,000	97 (82.2)
		31,000–60,000	21 (17.8)

The largest proportion of participants belonged to the 41–50-year age group (33.1%). Most participants were female (67.8%), had secondary education (37.3%), were unemployed (51.7%), and were married (89.0%). Most participants (82.2%) reported a monthly family income of ₹0–30,000.

Table 2. Antibiotic-use and related characteristics of participants (n = 118)

SL NO	Variable	Category	Frequency, n (%)
1	Condition associated with self-medication	Fever	68 (57.6)
		Cough	42 (35.6)
		Pain	41 (34.7)
		Diarrhoea	5 (4.2)
		Nil	19 (16.1)
2	Source of medicine information	Doctor	89 (75.4)
		Media	13 (11.0)
		Pharmacist	8 (6.8)
		Previous prescription	8 (6.8)
3	Usual health facility accessed	Government	73 (61.9)
		Private	45 (38.1)
4	Antibiotic use in the previous six months	Yes	67 (56.8)
		No	51 (43.2)

Note: Multiple responses were permitted for conditions associated with self-medication; Fever was the most frequently reported condition associated with self-medication (57.6%), followed by cough (35.6%) and pain (34.7%). Doctors were the main reported source of medicine information (75.4%). Government health facilities were accessed by 61.9% of participants, and 56.8% reported antibiotic use during the previous six months.

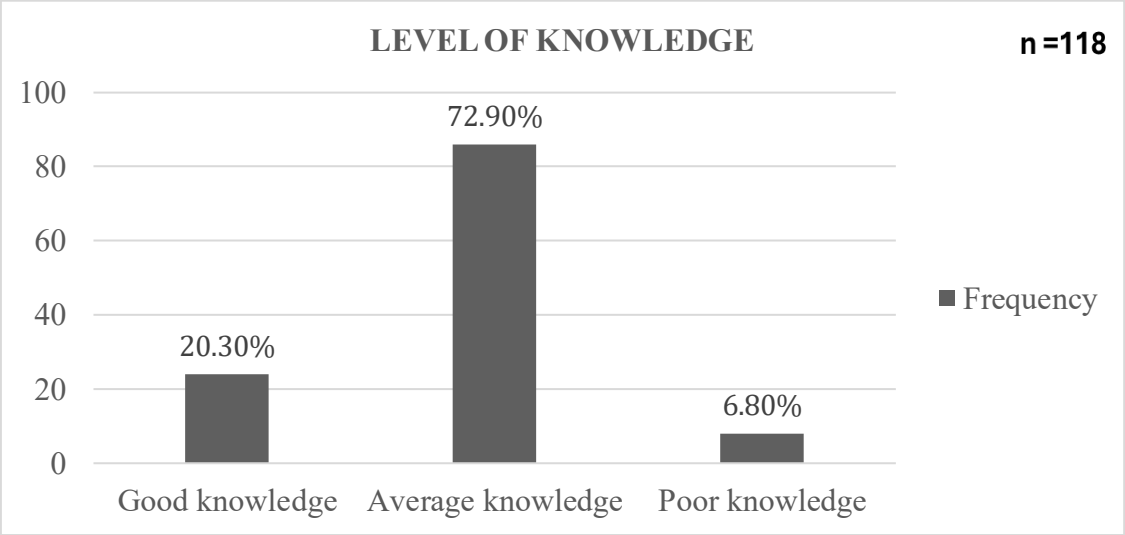
Knowledge regarding antibiotic resistance and self-medication

Most participants had average knowledge (86, 72.9%), while 24 (20.3%) had good knowledge and 8 (6.8%) had poor knowledge.

Table 11. Level of knowledge regarding antibiotic resistance and self-medication (n=118).

Knowledge level	Frequency	Percentage
Good knowledge	24	20.3%
Average knowledge	86	72.9%
Poor knowledge	8	6.8%

Figure 1: Bar chart showing distribution of subjects according to Level of knowledge regarding antibiotic resistance and self-medication.



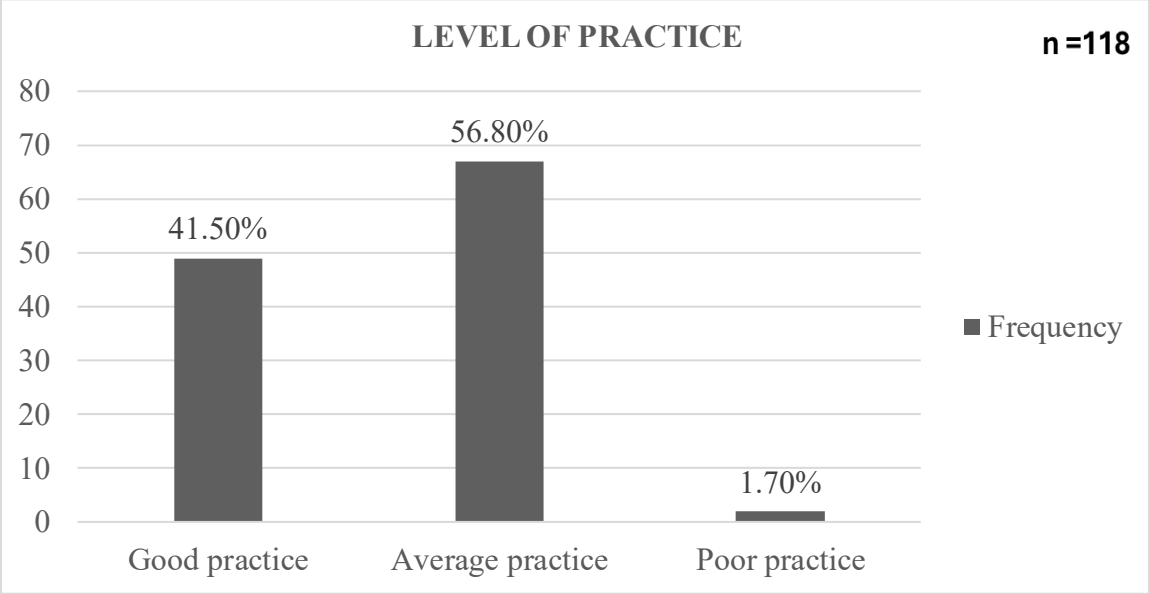
Practice regarding self-medication

According to the scoring and categories reported in the thesis, 67 (56.8%) participants had average practice, 49 (41.5%) had good practice, and 2 (1.7%) had poor practice.

Table 12. Level of practice regarding self-medication (n=118).

Practice level	Frequency	Percentage
Good practice	49	41.5%
Average practice	67	56.8%
Poor practice	2	1.7%

Figure 2: Bar chart showing ddistribution of subjects according to Level of practice regarding antibiotic self-medication



Associations and correlation

No statistically significant association was reported between knowledge score and age (p=0.209), gender (p=0.114), educational status (p=0.219), occupation (p=0.646), marital status (p=0.800), monthly family income (p=0.066), source of information (p=0.753), type of health facility accessed (p=0.376), or antibiotic use during the preceding six months (p=0.645).

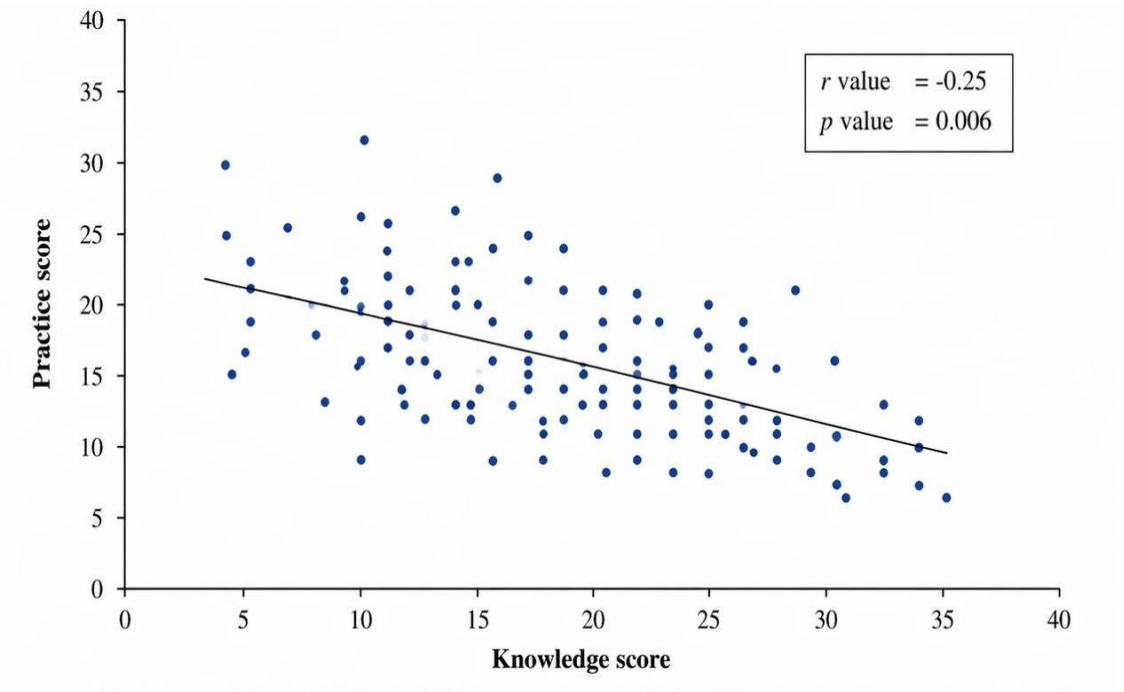
Practice scores were significantly associated with age (p=0.001), gender (p=0.026), educational status (p<0.001), occupation (p=0.029), monthly family income (p=0.034), type of health facility accessed (p=0.009), and antibiotic use during the preceding six months (p<0.001). No significant association was reported with marital status (p=0.834) or source of information (p=0.160).

Spearman's rank correlation showed a weak negative correlation between knowledge and practice scores (r=-0.25, p=0.006).

Table 13. Association of selected variables with knowledge and practice scores.

Variable	Knowledge p-value	Practice p-value
Age	0.209	0.001
Gender	0.114	0.026
Educational status	0.219	<0.001
Occupation	0.646	0.029
Marital status	0.800	0.834
Monthly family income	0.066	0.034
Source of information	0.753	0.160
Type of health facility accessed	0.376	0.009
Antibiotic use in previous 6 months	0.645	<0.001

Figure 3: Scattered diagram showing correlation between knowledge and practice scores



Discussion

In the present study of 118 adults, 86 (72.9%) had average knowledge regarding antibiotic resistance and self-medication, while 24 (20.3%) had good knowledge and 8 (6.8%) had poor knowledge. This indicates that although most participants had some understanding of the topic, good knowledge was not common. A community-based study from coastal South Karnataka similarly reported important gaps in public knowledge and understanding of appropriate antibiotic use and resistance [4].

Reported antibiotic-related practices were classified as good in 49 participants (41.5%), average in 67 (56.8%), and poor in 2 (1.7%) according to the study scoring system. Self-medication was most commonly reported for fever (68, 57.6%), followed by cough (42, 35.6%) and pain (41, 34.7%). These findings are comparable with community studies in which antibiotics were commonly self-medicated for symptoms such as fever, cough and other common illnesses [2,5]. The fact that 67 participants (56.8%) had used antibiotics during the previous six months further indicates frequent exposure to antibiotics in this population.

Doctors were the main reported source of medicine information for 89 participants (75.4%), followed by media (13, 11.0%), pharmacists (8, 6.8%) and previous prescriptions (8, 6.8%). Despite doctors being the major information source, self-medication remained common for several symptoms. This suggests that access to information may not always result in appropriate antibiotic-use behaviour, a pattern also described in previous studies examining antibiotic knowledge and practices [4,6].

Knowledge score was not significantly associated with age ($p=0.209$), gender ($p=0.114$), education ($p=0.219$), occupation ($p=0.646$), marital status ($p=0.800$), monthly income ($p=0.066$), source of medicine information ($p=0.753$), usual health facility ($p=0.376$), or antibiotic use during the previous six months ($p=0.645$). In contrast, practice score showed significant associations with age ($p=0.001$), gender ($p=0.026$), education ($p<0.001$), occupation ($p=0.029$), monthly income ($p=0.034$), usual health facility ($p=0.009$), and antibiotic use during the previous six months ($p<0.001$). No significant association was found with marital status ($p=0.834$) or source of medicine information ($p=0.160$).

The Spearman correlation showed a weak negative correlation between knowledge and practice scores (r=-0.25, p=0.006). Within the scoring framework used in this study, higher practice scores represented poorer practice; therefore, the negative correlation suggests that participants with better knowledge tended to report better practices, although the relationship was weak. This finding supports the view that knowledge is relevant to antibiotic-use behaviour but is unlikely to be the only factor influencing practice [4,6].

The findings support the need for focused community-level education on rational antibiotic use, particularly avoidance of unnecessary self-medication and use of leftover or previously prescribed antibiotics. Since doctors were the main source of medicine information for 75.4% of participants, healthcare professionals can provide an important opportunity to reinforce appropriate antibiotic-use messages. Such educational efforts should be accompanied by responsible antibiotic dispensing and accessible professional healthcare, as self-medication is influenced by both individual and healthcare-related factors [2,3].

Limitations

1. A non-probability convenience sampling was used to recruit participants from selected rural areas of Wayanad, which may limit the generalisability of the findings to other communities.
2. The cross-sectional design assessed knowledge and practices at a single point in time and does not establish causal relationships.
3. The data were based on participants' responses to a questionnaire and may be affected by recall bias and social desirability bias.

Conclusion

This study found that among 118 adults in selected rural areas of Wayanad, 72.9% had average knowledge regarding antibiotic resistance and self-medication, while 56.8% had average reported practice. Self-medication was most commonly reported for fever (57.6%), cough (35.6%) and pain (34.7%), and 56.8% of participants had used antibiotics during the previous six months.

Knowledge score was not significantly associated with the demographic and antibiotic-use variables assessed. However, practice score was significantly associated with age, gender, education, occupation, monthly income, usual health facility and recent antibiotic use. The significant but weak negative correlation between knowledge and practice (r=-0.25, p=0.006) suggests that better knowledge was associated with better reported practice, but knowledge alone may not be sufficient to ensure appropriate antibiotic use.

Therefore, community-based interventions should focus not only on improving knowledge but also on promoting appropriate antibiotic-use practices. Regular health education by nurses and other healthcare professionals, together with responsible antibiotic dispensing and appropriate use of healthcare services, may help reduce unnecessary self-medication and support antimicrobial stewardship in rural communities.

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