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ASSESSMENT OF ANTIBIOTIC DISPENSING AT COMMUNITY PHARMACIES IN PALLAVARAM

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Abstract

Aim: The study aims to evaluate the practice of antibiotic dispensing in community pharmacies and to assess the knowledge, attitude, and practices of community pharmacists on antimicrobial resistance and dispensing antibiotics without prescription. To assess the Antibiotics dispensing pattern in community pharmacies, non-prescription antibiotic sales and commonly reported illness for the use of antibiotics. (2) To assess the knowledge and awareness of antibiotics/AMR and dispensing antibiotics without prescription among dispensers at community pharmacies.

Methodology: A cross sectional descriptive study was carried out among pharmacists in the selected community pharmacies in and around Pallavaram. Pharmacists were interviewed by the investigator using a structured and validated Knowledge, attitude and practice (KAP) questionnaire regarding antibiotic resistance and dispensing of antibiotics without prescription.

Results : Among the 63 community pharmacists who took part in the study, 28 of them (44%) had "very good" knowledge regarding antibiotics use and resistance; majority of them (88.9%) showed "good" attitude and 55.6% of the participants had "good" practice towards antibiotic dispensing. The most commonly dispensed antibiotics included azithromycin, erythromycin, amoxicillin, cephalexin and metronidazole.

Conclusion: The present study identified that community pharmacists had 'average' levels of knowledge, attitude and non-prescription dispensing practices, reflecting the fact that the majority of the pharmacists were unaware of the appropriate use of antibiotics. Intervention strategies to combat antimicrobial resistance may include: health education to the general public and to the pharmacists about the personal and societal hazards of antibiotic resistance, the factors that cause it.

Key words: Community pharmacists, antimicrobial resistance, dispensing antibiotics without prescription, knowledge, attitude, practice

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INTRODUCTION

Due to the rapid emergence of antimicrobial resistance (AMR), antibiotics, which have revolutionized medicine and saved millions of lives globally, are losing their efficacy. Antimicrobial resistance occurs when bacteria, viruses, fungi, and parasites evolve and cease to respond to medications, making illnesses more difficult to cure and increasing the risk of disease spread, severe illness, and death.[1] The high prevalence of irrational antibiotic usage is one of the factors contributing to the rapid spread of AMR.[2] A number of studies demonstrate that self-medication and over-the-counter (OTC) antibiotic sales have a significant impact on the spread of ABR. In this regard, community chemists (CPs) could play an important role in the struggle against ABR because they are the first level of contact with people when they require medications or antibiotics.[3] Though the sale of antibiotics over the counter (OTC) is illegal, it is freely available without a prescription in India, since the rule is not strictly enforced.[4] Although several studies emphasize the significance of addressing pharmacists regarding the reasons for dispensing antibiotics without prescription, a wide range of factors, including their knowledge of and attitudes regarding antibiotic resistance, may influence pharmacists' practices. Some of the factors include lack of knowledge and awareness about appropriate use of antibiotics and concern over losing customers to competing pharmacies.[5]

Self-medication and unnecessary use of antibiotics for viral infections relates to the inappropriate use of antibiotics. It has been noticed that majority of the people suffering from viral upper respiratory tract infections such as common cold tend to use antibiotics inappropriately for treatment.[6]

METHODOLOGY

A cross-sectional descriptive study was conducted among pharmacists at selected community pharmacies in and around Pallavaram. The investigator conducted interviews with the community pharmacists using a standardized and validated Knowledge, attitude, behavior and practice (KAP) questionnaire about antibiotic resistance and the dispensing of antibiotics without a prescription.

A knowledge, attitude and practice (KAP) questionnaire regarding antibiotic resistance and dispensing of antibiotics without prescription was structured and validated. The questionnaire was developed after an extensive literature review (7, 3) to identify topics to cover in the study and to track opinions of community pharmacists about ABR and DAwP useful for comparisons with previous published studies. The final version consisted of 31 items divided into four sections. The first section (5 items, closed-ended items with multiple answers and open-ended items) gathered data on demographic and professional characteristics, including age, gender, number of years in practice as a CP, level of education and other work experiences (e.g., hospital pharmacist, medical sales representatives, etc.). The second section (9 items) evaluated pharmacists' knowledge about ABR and DAwP and its impact on the emergence of ABR and on public health. The third section (7 items) evaluated CPs' attitudes toward DAwP and ABR. The responses on knowledge and attitude questions were measured using a 5-point Likert-scale as follows; 1= 'strongly disagree', 2= 'disagree', 3= 'neutral', 4= 'agree', and 5= 'strongly agree'. The fourth section (10 items, on a five-point Likert scale response format) evaluated CPs' practices regarding dispensing antibiotics with or without prescription, reasons for DAwP, and if they usually asked information about the patient's medical history; if they warned clients about the potential side effects of

antibiotics, and informed clients about the importance of completing the full course of antibiotics. The responses on practice questions were measured using a Likert scale as follows; 1= 'never', 2= 'rarely', 3= 'occasionally', 4= 'often', and 5= 'always'.

For section 2 and 3, scoring was 1 - "strongly disagree", 2- "disagree", 3- "neutral", 4 - "agree", and 5 - "strongly agree" for questions (K01, K02, K06, K08) of section 2 and for questions (A01, A03, A04, A05, A07) of section 3.

For questions K03, K04, K05, K07, K09 and A02, A06, , reverse coding was done as they were negatively worded statements. For section 4, scoring was 1 for never, 2 for rarely, 3 for occasionally, 4 for often, and 5 for always for the questions (P01, P02, P03, P04, P05, P06, P09). For questions P07, P08 and P10 in this section, reverse coding was done as they were negatively worded statements.

STATISTICAL ANALYSIS: The Statistical Package for the Social Sciences (SPSS) 24 version was used for statistical analysis. Data were entered into Microsoft Excel sheets along with the names of all the variables. Data was presented in form of tables and charts and a Likert scale was used to determine the level of knowledge, attitude, and practices. A $p < 0.05$ was used to indicate statistical significance at a 95% confidence level.

RESULT

The demographic characteristics of 63 Community Pharmacists (CPs) who took part in the study are shown in table 1.

Table 1: Socio-demographic characteristics of participants (*n* = 63)

Parameters	**Frequency (%)**
1a: Gender	
Male	46(73)
Female	17(26.98)
1b: Age	
20-29	24(38)
30-39	15(24)
40-49	22(35)
≥ 50	2(4)
1c: Level of Education	
D Pharm	29(46)
B Pharm	19(30)
Non-pharmacy graduates	15(24)
1d: Work experience (years)	
1-4	20(32)
5-9	19(30)
≥ 10	24(38)

*The P value < 0.05 were considered statistically significant

Table 1 explains the socio-demographic characteristics of the pharmacists participated in the study, which gender, age, level of education, and years of experience. Most of the pharmacists involved in the study were males (73%) and 26.98% of them were females working in independent community pharmacies. The

mean age was 34.3 (standard deviation [SD] = ±8.9 years) .Only 11.1% of CPs reported previous work experience (6.5% as a medical sales representative and 5.1% as a hospital pharmacist). About 20 participants (32%) had practiced for less than five years, while 19(30%) had practiced for 5-9 years, and 24(38%) had practiced for more than 10 years. The mean years of experience of the participants were 7 ± 4 years. The educational qualification of 46% of the participants was a Diploma in Pharmacy, 30% was Bachelor of Pharmacy and 15 (24%) participants were non-pharmacy graduates.

Table 2: Knowledge of participants on the antibiotic usage and resistance (N=63)

Questions **K01 to K09**	**SD** **n(%)**	**D** **n(%)**	**N** **n(%)**	**A** **n(%)**	**SA** **n(%)**
K01- Antimicrobial resistance indicates that bacteria develop the ability to defeat the antibiotics designed to kill them.	0	5(7.93)	4(6.34)	47(74.6)	7(11.11)
K02- Early cessation of an antibiotic course is one of the cause of antibiotic resistance (ABR).	3(4.76)	6(9.52)	4(6.34)	44(69.84)	6(9.52)
K03- Antibiotics cure viral infections.	0	4(6.34)	16(25.39)	43(68.25)	0
K04- Antibiotics are essential and effective in common cold and cough.	0	6(9.52)	12(19)	45(71.42)	0
K05- Combinations of antibiotics can prevent ABR	0	41(65)	18(28.57)	4(6.34)	0
K06- Dispensing antibiotics without prescription contributes to misuse of antibiotics.	0	6(9.52)	9(14.28)	47(74.6)	1(1.58)
K07- Community pharmacists can legally dispense antibiotics without a prescription in India.	6(9.52)	47(74.6)	5(7.93)	5(7.93)	0
K08- Antibiotics could cause side effects.	0	7(11.11)	13(20.63)	43(68.25)	0
K09- If the symptoms improve before the full antibiotic course is completed, you can stop taking it.	7(11.1)	36(57.14)	10(15.87)	0	10(15.8)

SD- Strongly disagree; D- Disagree; N-Neutral; A-Agree; SA-Strongly agree

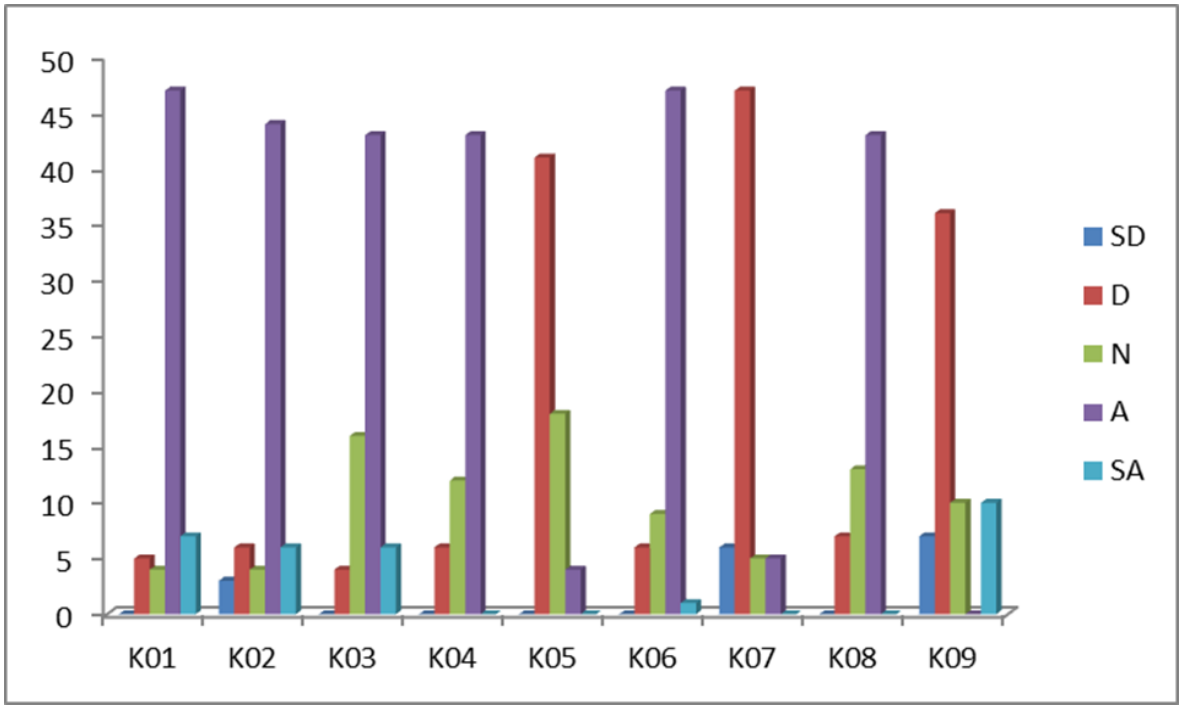

Fig 2: Knowledge of participants on the antibiotic usage and resistance

Table 2 explains the community pharmacists' knowledge of antibiotics and their indications. Seventy five percent of the participants agreed for the definition given for antibiotic resistance; 70% agreed that early cessation of an antibiotic course is one of the causes of ABR; 68% stated that antibiotics cure viral infections and 71% stated that antibiotics are essential and effective for cold and cough. Of all respondents, 65% (41/63) disagreed with combinations of antibiotics being able to prevent ABR. The majority of the CPs participating in the study knew that dispensing antibiotics without prescription is contributing to the spread of ABR and misuse of antibiotics (75%) and that it is illegal in India (74.6%); when asked whether antibiotic intake can be stopped before completion of a full course of treatment if symptoms improve, 57% pharmacists disagreed.

Table 3: Attitude of the participants toward antibiotic usage and resistance

Questions **A01 to A07**	**SD** **n(%)**	**D** **n(%)**	**N** **n(%)**	**A** **n(%)**	**SA** **n(%)**
A01- Client's self-medication with antibiotics is one of the causes of ABR.	0	4(6.34)	6(9.52)	42(66.6)	11(17.46)
A02- If the pharmacist refuses to give antibiotics without prescription, the client can easily get them from another pharmacy.	3(4.76)	13(20.63)	14(22.2)	30(47.61)	3(4.76)

A03- Community pharmacists should take an effective role in reducing ABR.	0	1(1.58)	4(6.34)	22(34.92)	36(57.14)
A04- Misuse/discriminate use of antibiotics can cause resistance.	0	1(1.58)	2(3.17)	52(82.53)	8(12.69)
A05- The use of antibiotics without prescription can lead to inappropriate drug and dose choice.	0	2(3.17)	12(19)	49(77.7)	0
A06- Antibiotics can be dispensed without prescription if a patient finds it difficult to consult a physician.	8(12.69)	42(66.6)	10(15.87)	3(4.76)	0
A07- Awareness on antibiotic resistance should be implemented at community pharmacy level as they can reduce the problem of ABR.	0	8(12.69)	23(36.5)	32(50.79)	0

SD- Strongly disagree; D- Disagree; N-Neutral; A-Agree; SA-Strongly agree

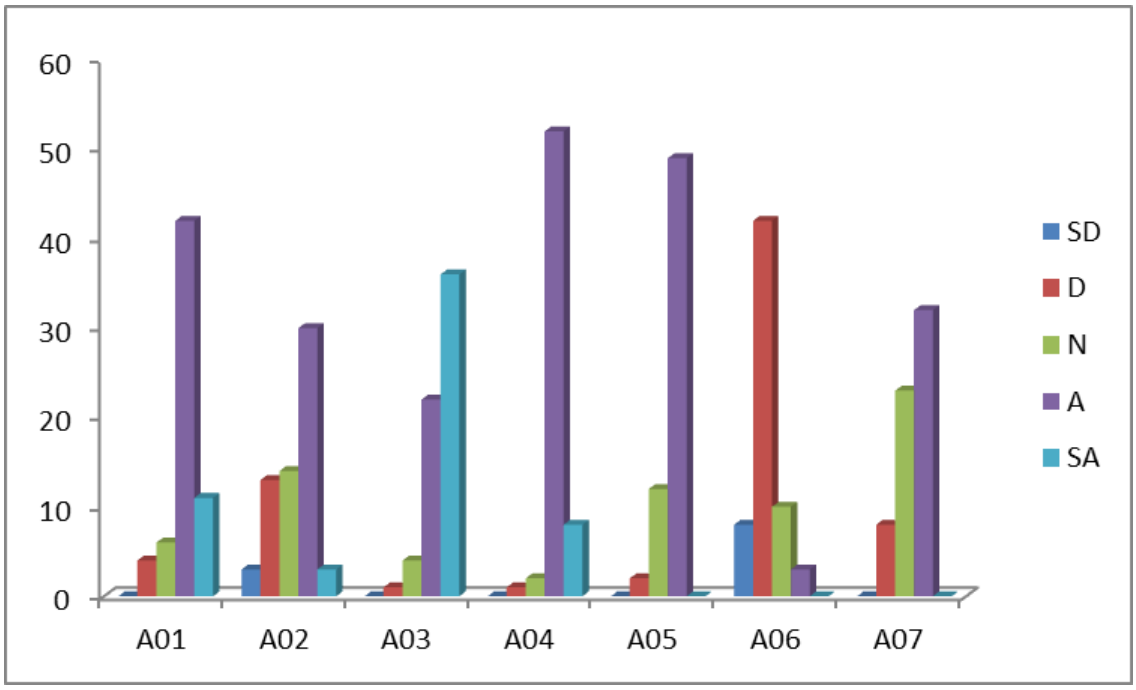

Fig 3: Attitude of the participants toward antibiotic usage and resistance

Table 3 explains the attitude of the pharmacists toward antibiotic resistance.

Among positive attitudes, a vast majority of 95.2% strongly agreed or agreed for the belief that misuse of antibiotics can lead to ineffective treatment. In contrast, Only 25% strongly disagree or disagree that if the CP refuses to give antibiotics without prescription, the client can easily get them from another pharmacy, showing positive attitudes. Almost all believed that CPs should take an effective role in reducing ABR (92%) and that a client's self-medication with antibiotics is one of the causes of ABR (84.12%).When questioned whether awareness of antibiotic resistance should be implemented at the community pharmacy level as they can reduce the problem of antibiotic resistance, half of the respondents (50%) agreed. Most pharmacists (92%-combining "agree" and "strongly agree") agreed to take a prominent role in antimicrobial resistance and infection-control programs if introduced by the Government of India and the statutory bodies.

Table 4: Antibiotics dispensing practices of the participants

Questions P01 to P10	**N** n(%)	**R** n(%)	**OC** n(%)	**O** n(%)	**A** n(%)
P01- I warn clients about the potential side effects of the drugs.	8(12.69)	11(17.4)	8(12.69)	15(23.8)	21(33.3)
P02- I advise clients about the importance of completing the full course of antibiotics.	0	4(6.34)	12(19)	10(15.8)	36(57.1)
P03- I ask clients if they are taking any other medication.	2(3.17)	5(7.93)	7(11.1)	18(28.57)	31(49.2)
P04-I ask clients to consult the physician.	2(3.17)	3(4.76)	5(7.93)	11(17.46)	42(66.6)
P05- I ask clients about drug allergies	2(3.17)	2(3.17)	7(11.11)	13(20.6)	39(61.9)
P06- I ask clients if they suffer from kidney/liver disease.	0	16(25.39)	11(17.46)	14(22.2)	22(34.9)
P07-I dispense antibiotics without a prescription on the patient request as I know the patient, I may lose the patient or they may try to get it from another pharmacy.	1(1.58)	10(15.87)	6(9.52)	17(26.98)	29(46)
P08- I dispense antibiotics for duration longer than prescribed by the physician on patient request.	18(28.5)	22(34.9)	15(23.8)	0	8(12.69)

P09- I dispense antibiotics with a prescription.	2(3.17)	7(11.11)	3(4.76)	22(34.9)	29(46)
P10- When the patient has insufficient money, I halve the course of antibiotics	2(3.17)	10(15.87)	89(12.69)	33(52.38)	10(15.87)

N- Never; R- Rarely; OC-Occasionally; O-Often; A-Always

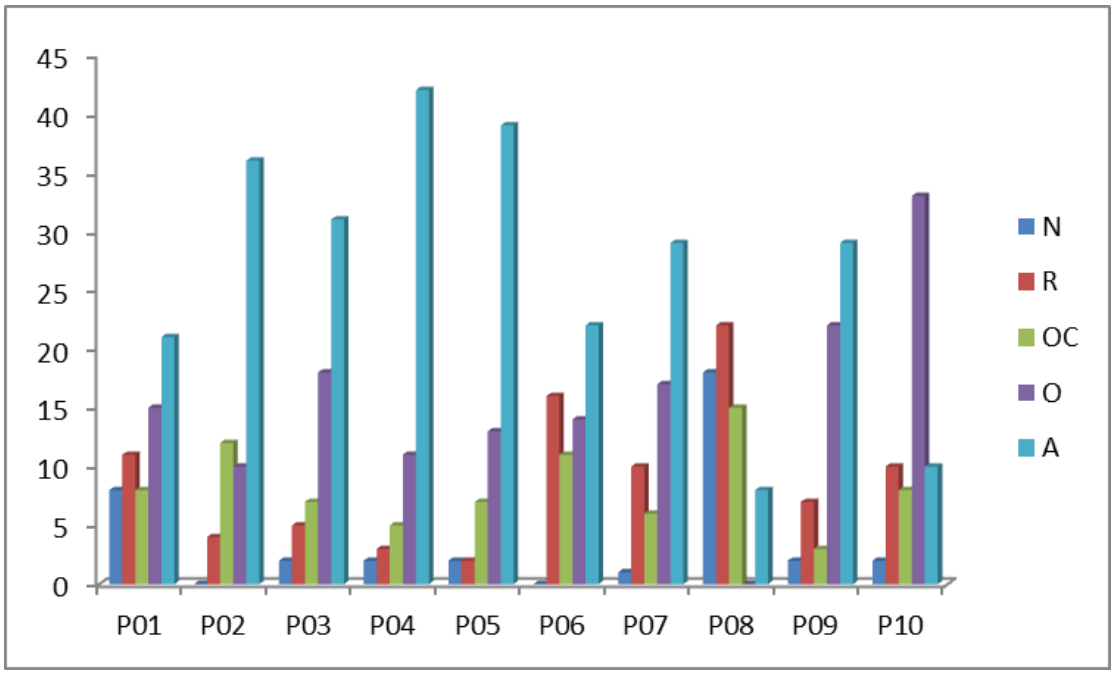

Fig 4: Antibiotics dispensing practices of the participants

Table 4 explains the responses given by the pharmacists to the questions to assess their dispensing practice of antibiotics. Only 29 (46%) pharmacists stated that they always dispensed antibiotics only with a prescription, 35% stated that they rarely dispensed antibiotics for duration longer than that prescribed by the doctor. Regarding the CPs' practices aimed at informing clients when dispensing antibiotics, 33% (21/63) always warned their clients about the potential side effects of the drugs and 15 of them (24%) stated that they often informed the patients regarding the side effects, and 57% informed them about the importance of completing the full course of antibiotics. More than half (62%) responded that they always ask clients about drug allergies and (67%) responded that they always ask clients to consult the physician. In contrast, only 34% admitted that they always ask if they are suffering from liver/kidney disease before deciding to dispense the antibiotic without a prescription. Also, 46% stated that they dispense antibiotics without a prescription on the patient request as I know the patient, or that they may lose the patient.

Correlations

		ktscore	Totalscore
knowledge	Pearson Correlation	1	-.146
	significance		<.001
practice	Pearson Correlation	-.146	1
	significance	<.001	

Correlations

		ktscore	atscore
knowledge	Pearson Correlation	1	-.001
	significance		.002
attitude	Pearson Correlation	-.001	1
	significance	.002	
		63	63

Correlations

		attitude	practice
attitude	Pearson Correlation	1	.175
	significance		.004
practice	Pearson Correlation	.175	1
	significance	.004	
		63	63

Table 5: correlations and significance between the knowledge, attitude, and practice of the pharmacists

Table 5 depicts the association between the variables knowledge, attitude, and dispensing practices of the community pharmacists. Knowledge had a significant positive correlation with the attitude and practices of the community pharmacists on antibiotic dispensing and antibiotic resistance ($P < 0.05$). There was a significant negative correlation between attitude and practice, indicating that poor attitude negatively impacted their practice ($P < 0.05$)

KNOWLEDGE SCORE IN ANTIMICROBIAL USE AND RESISTANCE

Statistics

		K01	K02	K03	K04	K05	K06	K07	K08	K09
N	Valid	63	63	63	63	63	63	63	63	63
	Missing	0	0	0	0	0	0	0	0	0
Median		4.00	4.00	2.0000	2.0000	4.0000	4.00	4.0000	4.00	4.0000
Minimum		2	1	2.00	2.00	2.00	2	2.00	2	1.00
Maximum		5	5	4.00	4.00	4.00	5	5.00	4	5.00

Table 6: Knowledge score of participants for each question.

Knowledge(K01-K09)

score

N	Valid	63
	Missing	0
Mean		30.5238
Median		30.0000
Std. Deviation		2.64488
Minimum		23.00
Maximum		40.00

Table 7: Knowledge score of participants in antimicrobial use and resistance

Table 7 shows descriptive statistic of total knowledge score. The total knowledge score of the participants ranged from 23 to 40 points, with an average score of 30.52 (±2.644), and a median score is 30.00.

Knowledge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	acceptable	12	19.0	19.0	19.0
	good	23	36.5	36.5	55.6
	very good	28	44.4	44.4	100.0
	Total	63	100.0	100.0	

Table 8: Overall knowledge score

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Knowledge total score	.155	63	<.001

Table 9 : Kolmogorov-Smirnov Test of total knowledge score normal distribution

According to one-sample Kolmogorov-Smirnov test, it has a hypothesis that distribution of data is normal. The results can be interpreted that total knowledge score of participants in this study does not have a normal distribution at p-value < 0.001 (Table 9). So, non-parametric statistic is suitable for analysis in this study.

ATTITUDE SCORE IN ANTIMICROBIAL USE AND RESISTANCE

Statistics

		A01	A02	A03	A04	A05	A06	A07
N	Valid	63	63	63	63	63	63	63
	Missing	0	0	0	0	0	0	0
Median		4.00	2.0000	5.00	4.00	4.00	4.0000	4.00
Minimum		2	1.00	2	2	2	2.00	2
Maximum		5	5.00	5	5	4	5.00	4

Table 10: Attitude score of participants for each question.

Attitude(A01-A07)

totalscore

N	Valid	63
	Missing	0
Mean		26.22
Median		26.00
Std. Deviation		1.818
Minimum		22
Maximum		32

Table 11 : Attitude score of participants in antimicrobial use and resistance

Table **11** shows descriptive statistics of the total attitude score. The total attitude score of the participants were between 22 and 32 points, average score is 26.22 (±1.818), and median score is 26.00.

Attitude

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	acceptable	5	7.9	7.9	7.9
	good	56	88.9	88.9	96.8
	very good	2	3.2	3.2	100.0
	Total	63	100.0	100.0	

Table 12: Overall attitude score

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Total attitude score	.182	63	<.001

Table 13 : Kolmogorov-Smirnov Test of total attitude score normal distribution

To confirm that the attitude score needs to be analyzed by non-parametric statistics, one sample Kolmogorov-Smirnov test was used for analyzing the hypothesis that attitude score has a normal distribution (Table 13). Results of the test show that p-value of the test < 0.001, which is a significant difference for the hypothesis. So, it can be interpreted that total attitude score does not have a normal distribution. It confirms the need to use non-parametric statistical analysis for comparing factors as well as the total knowledge score

PRACTICE SCORE IN ANTIMICROBIAL USE AND RESISTANCE

Practice (P01-P10)

Totalscore

N	Valid	63
	Missing	0
Mean		36.43
Median		37.00
Std. Deviation		4.471
Minimum		27
Maximum		46

Table 14: Practice score of participants in antimicrobial use and resistance

Table 14 shows descriptive statistic of total practice score. The total practice score of the participants were between 27 and 46 points, average score is 36.43 (±4.471), and median score is 37.00.

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Practice total score	.114	63	<.001

Table 15: Kolmogorov-Smirnov Test of total practice score normal distribution

To confirm that the practice score needs to be analyzed using non-parametric statistics, one-sample Kolmogorov-Smirnov test was used for the hypothesis that the practice score is of normal distribution (See table 15). Results of the test show that p-value of the test < 0.001, so, it can be interpreted that total practice score is not of normal distribution. It confirms the need to use non-parametric statistical analysis to compare factors

Practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	good	35	55.6	55.6	55.6
	poor	28	44.4	44.4	100.0
	Total	63	100.0	100.0	

Table 16: Overall practice score

Overall scoring for knowledge, attitude, and practice was done in such a way that a median score of 0.5-1 was assigned "very poor", 1.5-2 "poor", 2.5-3 "acceptable", 3.5-4 "good", and 4.5-5 "very good". Outcomes regarding practices were dichotomized as "good" versus "poor". For this, scores for practices were summed, scores ≥ 35 were considered good, and scores < 35 were deemed poor.(see table 8, 12 and 16)

DISCUSSION

The pharmacists had a basic qualification of a Diploma in Pharmacy, and 38% of them were in the age range of 20-29 years. Community pharmacies are the first level of contact for the common public to approach for minor ailments like sore throat, flu, and diarrhea. Community pharmacists contribute significantly towards irrational use of the antibiotics by dispensing them without a prescription.

The most commonly dispensed antibiotics for such sale included azithromycin, erythromycin, amoxicillin, co-amoxiclav, levofloxacin and metronidazole. Azithromycin, cephalexin, amoxicillin was commonly dispensed without prescription for patients having ENT infections, upper respiratory tract infections, lower respiratory tract infections; erythromycin were also dispensed by the pharmacists for the same clinical conditions. Metronidazole was dispensed for gastrointestinal infections like diarrhea and dental complaints; levofloxacin was dispensed for patients with urinary tract infections (UTI).

Half of the participants (52%) stated that they halve the course of antibiotics when the patient has insufficient money. These patients preferred to buy medicines for 1–3 days, either due to lack of money or because they knew they would recover after taking a few doses.

When questioned as to how the patients knew which medicines to ask for, the pharmacists stated that patients would have old prescriptions or used strips of medicine which they had used for relief of similar symptoms in the past. When asked if they read the date on the prescription when a patient approaches for an antibiotic with an old prescription, only few responded yes to the question. Some of these pharmacies did not readily admit to the sale of antibiotics without prescription but had to be asked in a friendly manner to do so.

CONCLUSION

The present study identified that community pharmacists had average levels of knowledge, attitude and non-prescription dispensing practices, reflecting the fact that the majority of the pharmacists were unaware of the appropriate use of antibiotics. Intervention strategies to combat antimicrobial resistance may include: health education to the general public and to the pharmacists about the personal and societal hazards of antibiotic resistance, the factors that causes it.

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