

Knowledge and perceptions of prescribers regarding adherence to standard treatment guidelines for malaria: a comparative cross-sectional study from Pakistan

M. Malik,^{1,2} M.A.A. Hassali,¹ A.A. Shafie¹ and A. Hussain²

معارف ومدرجات محوري الوصفات الطبية حول الالتزام بالدلائل الإرشادية العلاجية المعيارية للملاريا: دراسة مقارنة مستعرضة من باكستان

مدیحة مالک، محمد عزمی، أحمد حسالی، عسرول أكمل شافعی، أزهر حسین

الخلاصة: على الرغم من توافر الدلائل الإرشادية العلاجية المعيارية للملاريا في باكستان فإن التزام محوري الوصفات بها سيء. وتستهدف هذه الدراسة الوصفية المستعرضة استقصاء مدرجات ومعارف محوري الوصفات الطبية في مدينتي إسلام آباد وراولپنڈي حول الالتزام بالدلائل العلاجية المعيارية للملاريا. وقد وزع الباحثون استبياناً على عينة عشوائية تضم 360 من محوري الوصفات الطبية، واتضح أن 64.7% منهم كانوا راضين بالأدوية المتوافرة المضادة للملاريا، وأن 41.3% موافقون على أن الأدوية المضادة للملاريا ينبغي أن لا توصف إلا بعد إجراء اختبار تشخيصي. ولم تكن الدلائل الإرشادية متوافرة إلا عند نصف المرافق الصحية التي يعمل بها محرورو الوصفات الطبية. وكان جميع محوري الوصفات الطبية تقريباً (97.7%) موافقين على الحاجة لمزيد من البرامج التعليمية حول الدلائل الإرشادية، وكان معظم محوري الوصفات الطبية غير مطلعين على النظام العلاجي المعياري الصحيح للمتصورة المنجلية والمتصورة النشيطة. ولم يكن هناك اختلاف في المعارف بين الذكور والإناث، إلا أن محوري الوصفات ذوي الخبرة الأكثر، والذين يمارسون باعتبارهم أطباء عامين ويعملون في مرافق الرعاية الصحية الخاصة يمتلكون معارف أفضل من غيرهم من الزملاء.

ABSTRACT Despite the availability of standard treatment guidelines for malaria in Pakistan adherence to protocols by prescribers is poor. This descriptive, cross-sectional study aimed to explore the perceptions and knowledge of prescribers in Islamabad and Rawalpindi cities towards adherence to standard treatment guidelines for malaria. A questionnaire was distributed to a random sample of 360 prescribers; 64.7% were satisfied with the available antimalarial drugs and 41.3% agreed that antimalarial drugs should only be prescribed after diagnostic testing. Only half the prescribers had the guidelines available in their health facility. Almost all the prescribers (97.7%) agreed that there was a need for more educational programmes about the guidelines. Most prescribers were unaware of the correct standard treatment regimen for *Plasmodium falciparum* and *P. vivax* malaria. There were no differences in knowledge between males and females, but prescribers having more experience, practising as general practitioners and working in private health-care facilities possessed significantly better knowledge than their counterparts.

Connaissances et perceptions des prescripteurs concernant les guides thérapeutiques normalisés pour le paludisme et le respect de ces derniers : étude transversale comparative menée au Pakistan

RÉSUMÉ Malgré la disponibilité de guides thérapeutiques normalisés pour le paludisme au Pakistan, le respect des protocoles de soins par les prescripteurs est médiocre. La présente étude descriptive et transversale visait à explorer les connaissances des prescripteurs dans les villes d'Islamabad et de Rawalpindi concernant les guides thérapeutiques normalisés pour le paludisme et leurs perceptions du respect de ces guides. Un questionnaire a été distribué à un échantillon aléatoire de 360 prescripteurs ; 64,7 % étaient satisfaits des médicaments antipaludiques disponibles et 41,3 % convenaient que les antipaludéens devaient être prescrits uniquement après un test diagnostique. Seule la moitié des prescripteurs possédaient les guides thérapeutiques sur leur lieu de travail. Presque tous les prescripteurs (97,7 %) convenaient que davantage de programmes d'éducation sur ces guides étaient nécessaires. La plupart des prescripteurs ignoraient les bons schémas thérapeutiques types pour le paludisme à *Plasmodium falciparum* et *P. vivax*. Aucune différence n'a été observée entre les connaissances des hommes et des femmes. Toutefois, les prescripteurs chevronnés, ceux exerçant comme médecins généralistes et travaillant dans des établissements de soins de santé privés avaient de bien meilleures connaissances que leurs confrères.

¹Discipline of Social and Administrative Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia, Penang, Malaysia.

²Hamdard Institute of Pharmaceutical Sciences, Islamabad, Pakistan (Correspondence to M. Malik: mady_sweet1@yahoo.com).

Introduction

Irrational use of drugs has become a serious problem in developing countries. One of the causes of irrational drug use is the absence and/or lack of implementation of standard treatment guidelines (STGs) for the most common diseases in these countries [1]. This has resulted in prescribing and dispensing of different drugs for the same disease, resulting in non-uniform treatment. STGs are one of the tools to support effective clinical practice and promote the rational use of drugs. Treatment guidelines are designed with the collective opinion of a wide group of recognized national experts and are used as a guide to treatment choices and also as a reference book to help in the overall management of patients [2]. In the case of malaria several studies have reported inappropriate prescribing practices in both public and private health-care facilities due to lack of adherence of prescribers with the STGs [3–6]. Other studies have reported improved case management after implementation of STGs, but have shown little impact on prescribing habits due to lack of follow up on the implementation of these guidelines [7–9]. Rational prescribing requires that prescribers follow a standard process of prescribing in accordance with STGs, which enables a consistent, therapeutically effective and economically efficient use of drugs. In turn, prescribers' professionalism and commitment to conforming to the criteria for rational drug use has a positive influence on the compliance of patients and outcome of therapy [10].

National treatment guidelines for malaria in Pakistan were designed and published in 2005, through collaborative efforts of the Pakistan Directorate of Malaria Control, the World Health Organization and a technical core group [11]. The guidelines included diagnostic criteria, choice of drug treatment, follow-up and measures to be taken for prevention and control for malaria. The

treatment for uncomplicated malaria includes chloroquine + primaquine for the treatment of malaria caused by *Plasmodium vivax*, or artesunate + sulphadoxine/pyrimethamine for the treatment of *P. falciparum* malaria. Chloroquine is recommended as first-line drug in the treatment of all types of malaria if laboratory diagnosis is not confirmed, while artemether/lumefantrine is recommended as the first-line drug only for confirmed cases of *P. falciparum*.

Despite the introduction of STGs the country, most medical practitioners in Pakistan are inclined to practice their own protocols to treat malaria rather than adhering to standard regimens [12,13]. This might eventually lead to the emergence of higher rates of resistance to antimalarial drugs in the country [14]. The main objective of the present study was to explore the perceptions and knowledge of prescribers towards adherence to national STGs for malaria in 2 cities of Pakistan.

Methods

Study design

A descriptive, cross-sectional study design was used to evaluate the knowledge and perceptions of prescribers regarding adherence to standard treatment regimen for malaria in the 2 major cities of Pakistan: Islamabad (the national capital) and Rawalpindi (its twin city). The study was approved by the Pakistan malaria control programme.

Sampling of facilities and respondents

This study was conducted from January to March 2011. The study population included prescribers from Islamabad and Rawalpindi. Calculations of sample size were performed using *Raosoftware* sample size calculator to determine the size of sample that represents the population of registered prescribers [15]. Considering the current population of registered prescribers ($N = 5615$),

a sample size of 360 was required to achieve 95% confidence level with 5% margin of error. A sample of 360 prescribers was selected randomly from the 2 cities (180 prescribers per city). The prescribers were contacted and given an explanation of the purpose of the study, and their verbal consent to participate in the study was obtained. None of the prescribers refused to participate in the study.

Study tool

A questionnaire was developed through focus group discussions by using the national STGs for malaria as a reference. Two focus group discussions were carried out at different time intervals with 4 different groups of experts including malariologists and clinicians working at the malaria control programme, specialists, physicians and doctors from academia. Each group comprised 3–4 participants for the development, finalization, face and content validity of the data collection tool. Pilot testing was carried out on 38 prescribers (10%) of the total sample size before beginning the final study. A Cronbach alpha value of 0.72 confirmed the reliability and internal consistency of the questionnaire.

The questionnaire comprised 5 sections. The first section included information regarding prescriber's demographic characteristics: sex, city, sector (public/private), type of health facility, profession and years of experience. In the second section, perceptions of prescribers regarding current treatment practices for malaria in the country were explored. In the third section the perceptions of prescribers regarding contributing factors towards lack of adherence to STGs were explored, including patient-related factors, availability and accessibility of the guidelines for reference, prescriber's experience/personal preference and lack of guideline enforcement. Sections 2 and 3 of the questionnaire included a set of statements in which respondents were asked to indicate their level of agreement

using a 4-point Likert scale where 1 = strongly disagree, 2 = disagree; 3 = agree and 4 = strongly agree. A 4-point Likert scale was used in order to avoid confusion with neutral responses. In the fourth section, the perceptions of prescribers regarding the effectiveness of different currently available antimalarial drugs were explored. In the last section, the knowledge of prescribers regarding standard treatment regimens for malaria was assessed in 2 subscales. Responses were assigned as 1 = yes/correct and 2 = no/incorrect. Subscale 1 included 2 questions regarding standard treatment regimens for *P. vivax* (score 2–4) while subscale 2 included 4 questions regarding standard treatment regimens for *P. falciparum* (score 4–8). The composite score range was 6–12 and a lower score indicated better knowledge.

Data collection

Two teams, one in each city, with 10 data collectors in each team, were trained by the group of experts including the principal investigator. The questionnaire was hand-delivered to prescribers by the data collectors. Informed and verbal consent for participation was taken from the respondents. Respondents were assured about the confidentiality of information verbally and were shown an undertaking signed by the principal investigator. The questionnaire was self-completed by the prescribers and was collected from them on the same day.

Data analysis

The data were computed and analysed using SPSS, version 16 program and descriptive analysis was conducted. The results of each item in the questionnaire were reported as percentages and frequencies. The Kruskal–Wallis test ($P \leq 0.05$) was used to compare the knowledge scores of prescribers about standard malaria regimens by profession, length of experience and type of health-care facility, and the Mann–Whitney test ($P \leq 0.05$) was used to

compare the knowledge of prescribers by sex, sector and city.

Results

Background characteristics

Out of 360 prescribers, 62.2% were male while 37.8% were female (Table 1). Just over two-thirds (68.1%) of the total prescribers were working in the public sector, while 31.9% were from the private sector. A total of 72.2% were working in tertiary health-care facilities (providing specialized health care in large research and teaching hospitals), 2.2% in secondary health-care facilities (Tehsil headquarters and district head-quarter hospitals), 5.0% in basic health units (providing primary health care services including health protection and promotion services) and 20.6% were from private clinics. Cases were referred from lower to higher level (primary to tertiary) depending on the severity of problem and the available

infrastructure. Of the total prescribers 20.6% were house officers, 56.9% medical officers, 7.5% specialists and 15.0% general practitioners. Regarding the experience of the prescribers, 20.3% had working experience of < 1 year, 42.8% had 1–5 years, 22.2% had 6–10 years and 14.7% had > 10 years.

Satisfaction with available antimalarial drugs

The results highlighted that 64.7% of the prescribers were satisfied with the currently available antimalarial drugs and 41.3% agreed that prescribing antimalarial drugs after performing a diagnostic test was beneficial in the management of malaria. Just over half (56.3%) of the prescribers reported the absence of STGs for malaria in their health-care facility and 94.1% agreed that prescribing from the STGs was cost-effective. The great majority of prescribers (97.7%) agreed that there was a need for more educational programmes to increase knowledge and awareness

Table 1 Background characteristics of the sample of prescribers ($n = 360$)

Variable	No.	%
Sex		
Male	224	62.2
Female	136	37.8
Sector		
Public	245	68.1
Private	115	31.9
Type of health facility		
Tertiary hospital	260	72.2
Secondary hospital	8	2.2
Basic health unit	18	5.0
Private clinic	74	20.6
Profession		
Specialist	27	7.5
Medical officer	205	56.9
House officer	74	20.6
General practitioner	54	15.0
Experience (years)		
< 1	73	20.3
1–5	154	42.8
6–10	80	22.2
> 10	53	14.7

Table 2 Prescribers' opinions regarding management of malaria in Pakistan

Item	Prescribers' opinions (n = 360)							
	Strongly disagree		Disagree		Strongly agree		Agree	
	No.	%	No.	%	No.	%	No.	%
Malaria is well controlled with the current available antimalarial drugs in Pakistan	15	4.2	112	31.1	207	57.5	26	7.2
National standard malaria treatment guidelines are available in the health facility	188	52.2	15	4.2	77	21.4	80	22.2
Prescribing antimalarials before performing diagnostic test is beneficial in the management of malaria	31	8.6	180	50.0	75	20.8	74	20.6
Prescribing antimalarial drugs for malaria according to the guidelines are cost-effective	10	2.8	11	3.1	215	59.7	124	34.4
There is a need for more educational programmes to increase knowledge and awareness on the available malaria treatment guidelines	1	0.3	7	1.9	142	39.4	210	58.3

about the available treatment guidelines for malaria (Table 2).

Factors affecting lack of adherence

A majority of prescribers were of the view that patient-related factors (93.8%), availability of STGs for reference (98.6%), lack of awareness of prescribers regarding STGs (70.2%), prescribers' experience (95.5%) and lack of enforcement of STGs for malaria (97.5%) were the main factors contributing towards lack of adherence to STGs in the management of malaria in Pakistan (Table 3).

Effectiveness of antimalarial drugs available

Most of the prescribers were of the view that artemisinin-based combination therapy (ACT) (89.7%), chloroquine

+ primaquine (89.7%) and primaquine 0.75 mg/kg (82.2%) were the most effective antimalarial drugs available in Pakistan for management of malaria. Single-dose primaquine + ACT (77.2%) and dihydroartemisinin + piperazine (40.3%) were considered the least effective antimalarial drugs (Table 4).

Prescribers' knowledge about standard treatment regimens

Most of the prescribers were unaware of the correct standard treatment regimens for *P. falciparum* and *P. vivax* malaria. Only 66.4% of the prescribers were aware about the correct regimen for chloroquine and 23.3% knew the correct regimen for primaquine used for treatment of *P. vivax* malaria. On the other hand, 74.7% knew the correct regimen for artemether/lumefantrine and 35.3% were aware about the regimen

for artesunate used for treatment of *P. falciparum* malaria (Table 5).

The composite scores for knowledge were taken into account when assessing the knowledge of prescribers for the whole therapeutic regimen. The median score for overall knowledge of prescribers regarding the malaria treatment regimen was 10 (range 6–12), for the treatment regimen for *P. vivax* it was 3 (range 2–4) and for *P. falciparum* it was 7 (range 4–8).

Significant differences were found in the knowledge scores of prescribers between those in the public and private sector and between the 2 cities, while no significant difference was found between the sexes ($P < 0.05$, Mann–Whitney test). Prescribers working in the private sector had comparatively better knowledge about the standard

Table 3 Prescribers' perceptions about factors affecting adherence to standard treatment guidelines (STGs) in management of malaria in Pakistan

Factor	Prescribers' perceptions (n = 360)							
	Strongly disagree		Disagree		Strongly agree		Agree	
	No.	%	No.	%	No.	%	No.	%
Patient-related factors	1	0.3	21	5.8	261	72.5	77	21.4
Availability of STGs for reference	1	0.3	4	1.1	235	65.3	120	33.3
Lack of awareness regarding STGs	2	0.6	5	1.4	205	56.9	148	41.1
Prescribers' experience	4	1.1	12	3.3	155	43.1	189	52.5
Lack of STGs enforcement	1	0.3	8	2.2	172	47.8	179	49.7

Table 4 Prescribers' perceptions about effectiveness of different antimalarial drugs for *Plasmodium falciparum* and *P. vivax* in the management of malaria in Pakistan

Antimalarial drug	Prescribers' perceptions (n = 360)			
	Least effective		Most effective	
	No.	%	No.	%
Artemisinin-based combination therapy (ACT)	37	10.3	323	89.7
Dihydroartemisinin + piperazine	145	40.3	215	59.7
Artesunate + tetracycline/ doxycycline/ clindamycin	88	24.4	272	75.6
Single-dose primaquine + ACT	278	77.2	82	22.8
Primaquine 0.75 mg/kg body weight	64	17.8	296	82.2
Chloroquine + primaquine	37	10.3	323	89.7
ACT + primaquine	87	24.2	273	75.8

treatment regimen for malaria than those in the public sector and those in Rawalpindi had better knowledge than in Islamabad (Table 6). Prescribers working as specialists had significantly better knowledge than other professions, while those with more years of experience and those practising as specialists had better knowledge ($P < 0.05$, Kruskal–Wallis test).

Discussion

Most of the medical practitioners in developing countries including Pakistan are inclined to practise their own protocols to treat malaria rather than adhering to standard regimens [12]. The results of the present study

showed that most of the prescribers agreed that the absence of STGs for malaria in their health-care facilities, lack of awareness of prescribers regarding STGs, prescribers' experience and lack of enforcement of STGs were the main factors contributing to irrational treatment practices for malaria in Pakistan. The results of the present study were in line with a study conducted in Nigeria, which showed similar findings in terms of irrational prescribing practices due to lack of adherence to national treatment guidelines although they did not link this to the development of resistance [16].

The results of the present study highlighted that most of the prescribers were satisfied with the currently available antimalarial drugs, although little

data regarding the resistance of currently available antimalarial drugs have been reported in Pakistan. However, poor vector control, limited access to antimalarial drugs, lack of laboratory investigation and lack of a national database for registering the actual number of malaria cases in different provinces of Pakistan might be the main factors contributing to the high prevalence of malaria in the country [13]. Around half of prescribers also agreed that prescribing of antimalarial drugs after performing a diagnostic test is beneficial in the management of malaria. It was observed that prescribing of antimalarial drugs after laboratory confirmation significantly decreased the total number of prescriptions in Malawi [17]. ACT was the most effective antimalarial

Table 5 Prescribers' knowledge about standard treatment regimens for malaria

Antimalarial treatment	Prescribers' knowledge about standard treatment regimen (n = 360)			
	Correct		Incorrect	
	No.	%	No.	%
Standard treatment regimen for <i>Plasmodium vivax</i> malaria				
Chloroquine (150 mg/kg 4× day 1 & 2, 2× 3 rd day) for 3 days + primaquine (0.25 mg/kg 1× per day) for 14 days	239	66.4	121	33.6
Primaquine (0.75 mg/kg body weight 1× per week) for 8 weeks	84	23.3	276	76.7
Standard treatment regimen for <i>Plasmodium falciparum</i> malaria				
Artemether (20 mg per day) + lumefantrine (120 mg 2× per day) for 3 days	269	74.7	91	25.3
Artesunate (20 mg /kg 1× per day) + tetracycline (4 mg/kg 4× per day) for 7 days	127	35.3	233	64.7
Dihydroartemisinin (4 mg/kg per day) + piperazine (18 mg/kg per day) for 3 days	122	33.9	238	66.1
Single-dose piperazine (0.75 mg/kg) equivalent to ACT	102	28.3	258	71.7

ACT = artemisinin-based combination therapy.

drug for the management of malaria in Pakistan according to almost 90% of our respondents. The results of the study are in line with another study which showed predominately use of ACT for the treatment of malaria in Nigeria [18].

The overall knowledge of prescribers regarding standard treatment regimens for malaria was inadequate in Pakistan. Most of the prescribers were unaware of the correct standard treatment regimen for the treatment of *P. falciparum* and *P. vivax*. This might be due to the lack of implementation of STGs for malaria in the country. The results of the present study confirm the findings of a study in Cambodia, which concluded that the high rate of inappropriate prescriptions for malaria are

mostly due to lack of or inappropriate doses, frequency, dosages and duration of treatment [19].

We found no difference between male and female prescribers in knowledge regarding the standard treatment regimen for malaria, although prescribers working in the private sector and in Rawalpindi had comparatively better knowledge than public sector workers and those in Islamabad, the capital. This might be due to the fact that a greater proportion of the population visit the private sector for treatment. Previous studies have reported many problems associated with prescribing practices in both public and private health-care facilities and both private and public practitioners usually do not comply with the STGs [16,20].

The present study highlighted that prescribers having more experience and working as specialists possessed relatively better knowledge about malaria treatment. These results are in line with another study which also showed specialists to be more knowledgeable about care in general, as they use medications associated with improved survival, comply with STGs and use more resources including diagnostic tests and procedures [21]. In our study general practitioners had comparatively better knowledge regarding standard treatment regimen for malaria than their counterparts. This might be due to the fact that most of the specialists are working as general practitioners running their own private clinics in the evening in Pakistan. General practitioners are

Table 6 Comparison of prescribers' knowledge scores about standard treatment regimen for malaria by demographic characteristics

Variable	No.	Median knowledge score	Test statistic	P-value
Sex			15.081 ^a	0.438
Male	224	10		
Female	136	10		
City			14.177 ^a	0.019
Islamabad	180	9		
Rawalpindi	180	10		
Sector			9.330 ^a	< 0.001
Public	245	10		
Private	115	9		
Type of health facility			26.72 ^b	< 0.001
Tertiary hospital	260	10		
Secondary hospital	8	9.5		
Basic health unit	18	9.5		
Private clinic	74	9		
Profession			56.79 ^b	< 0.001
Specialist	27	9		
Medical officer	205	10		
House officer	74	8.5		
General practitioner	54	9		
Experience (years)			38.65 ^b	< 0.001
< 1	73	10		
1–5	154	10		
6–10	80	9		
> 10	53	9		
Total	360	10	–	–

^aMann-Whitney test; ^bKruskal-Wallis test.

usually the main prescribers of antimalarial drugs due to the ease of access to their services and affordability for a large proportion of the population. This illustrates the potential role of general practitioners in determining prescribing patterns. Thus attention should be focused on training of this group of prescribers in future interventions or when there are modifications or updates to the national antimalarial drugs policy [22]. Almost all of the prescribers in our survey were of the view that there is a need for more educational programmes to increase knowledge and awareness about the STGs. The influence of inappropriate prescribing of antimalarial drug on development of drugs resistance in malaria highlights the need to improve malaria treatment practices

through well organized and planned health education training programmes of prescribers [23,24].

The study was conducted in only 2 cities of Pakistan and the results of the study may not be generalizable to other parts of the country. Unavailability of a national updated database for registered malaria cases in Pakistan, financial and logistic constraints and political turmoil in the country were some of the problems faced during the conduct of the study.

Conclusions

The overall knowledge of prescribers regarding standard treatment regimens for malaria in the 2 cities of

Pakistan was inadequate. Most of the prescribers were unaware of correct standard treatment regimens for the treatment of *P. falciparum* and *P. vivax*. Prescribers having more experience, practising as general practitioners and working in private health-care facilities possessed comparatively better knowledge. This indicates the potential to promote rational drug use in the private sector even though the public sector is generally targeted for interventions. Innovative approaches are needed to promote and implement STGs in the country to improve the knowledge and adherence of prescribers in the hope that this will result in better practices and control of malaria in Pakistan.

Competing interests: None declared.

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