Self-medication practices in the management of malaria in the city of Bukavu in Eastern of Democratic Republic of Congo

Bashige Chiribagula Valentin ^{1,3,4,*}, Félicien Mushagalusa Kasali ², Okusa Ndjolo Philippe ³, Bakari Amuri Salvius ¹ and Lumbu Simbi Jean-Baptiste ⁴

¹ Laboratoire de pharmacognosie – Faculté des Sciences Pharmaceutiques – Université de Lubumbashi- 27, av Kato, Commune Kampemba, Lubumbashi-DR Congo

² Département de Pharmacie-Faculté des Sciences Pharmaceutiques et Santé Publique-Université officielle de Bukavu-DR Congo

³ Service de chimie thérapeutique et analyse des substances naturelles-Faculté des Sciences Pharmaceutiques (UNILU) - 27, av Kato, Commune Kampemba, Lubumbashi-DR Congo

⁴ Laboratoire de Chimie organique – Faculté des Sciences Université de Lubumbashi- 2 av de la maternité, Commune de Lubumbashi -DR Congo.

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Abstract

Self-medication for malaria management is very common in Democratic Republic of Congo (DRC). This study was conducted to determine the extent, characteristics and factors associated with this practice in medical area in the city of Bukavu. This cross-sectional descriptive study was carried out by direct interview between January and June 2018, in the internal medicine department of the General Referral Hospital (GRH) of Bukavu. Graph Pad software was used to analyze the data collected. Seven hundred eighty-five patients were consulted, among them 57.8% (average age 38.7 ± 8 years; average income: 95 ± 12 USD; gender male / female ratio: 0.47) practice self-medication with antimalarials. They used it for the first time at an average age of 6 ± 2 years. Quinine (91.4%) and Artemether- Lumefantrine (60.4%) are the most used antimalarial. Ascorbic acid (98.7%) and Paracetamol (89.2%) are the most medicines associates to antimalarial in self-medication. Several risks are incurred during this practice when the most cited are worsening side effects (53%), incomplete treatment (37%) and the occurrence of side effects (37%). Age (31-46 and > 61 years old), low income (50-150 USD), membership in a health sector and the pretension of knowledge of antimalarials, predispose subjects to self-medication. Self-medication with antimalarials is very common in Bukavu. It concerns both biomedicine and traditional medicine. There is an urgent need to regulate this practice to avoid its harmful consequences.

Graphical Abstract

Keywords: Self-prescription; GRH: General Referral Hospital; South Kivu; Antimalarials

* Corresponding author: Bashige Chiribagula Valentin

1. Introduction

Malaria is a haemoparasitic disease caused by obligate intracellular protozoan parasite of plasmodium species which are transmitted by infected female anopheline mosquito [1]. It is one of the most important public health problems worldwide [2,3]. In fact, each year, more than one third of the world's population is exposed to this parasitosis [4] and, more than 200 million people are affected [5,6] and more than 200 thousand die of it [7]. In 2019, 228 million cases were recorded worldwide including 95% in sub-Saharan Africa and 405,000 deaths reported [8]. In DRC, 97% of the population is exposed to this disease and thousands of deaths are due to it each year [9]. There is not a social security system supporting the health care which is supported by patients and their families. The majority of the population living below the poverty line and there is not enough resources for many families to pay medical consultations [10,11]. In Bukavu, although the city is in the low risk zone, this pathology is the leading cause of consultation and mortality. Access to primary health care is twice as low as in other parts of the country due to a permanent war which paralyzed the entire provincial economy and further deteriorated the health structure which was already in deficit [12]. Faced with this health scourge, which in most of these cases concerned countries with very modest income and where the health structure is not very efficient, the self-prescription is a very emerging phenomenon, particularly in the management of malaria.

Self-medication consists in the fact that an individual resorts to a drug, on his own initiative or that of a relative, in order to treat a disease or a symptom that he himself has identified, without consulting a health professional [13]. This practice concerns both developing countries [14, 15] as well as developed countries [16,17], the Mediterranean countries [18] and the tropical countries [19]. Several damages linked to this practice have previously been described such as the failure to control the indications, contraindications, dosages, administration rates and duration of treatment, but despite these damages the practice remains [20]. Several reasons may justify the persistence of this phenomenon the high cost of caring for patients in health facilities, low purchasing power, insufficient infrastructure and health personnel, the trivialization of certain diseases, the complicity of certain pharmacy salespeople not respecting the rules for dispensing drugs and lack of information and awareness on the risks associated with the misuse of drugs [14, 21–23]. However, the frequency of self-medication as well as its characteristics are experienced differently from one country to another, from one pathology to another and the control of this phenomenon is an important factor in the control of health policy.

Self-medication with antimalarials is widely used, while antimalarials are among the drugs that are supposed to be available only on medical prescription. This phenomenon is widespread in countries endemic to malaria which are in most cases countries with very low income. In Africa, cases of self-medication with antimalarials have been reported in several countries such as Nigeria [24], Cameroon [25], Benin [26], Tanzania [27,28], Kenya [29] and, Ethiopia [30]. In DR Congo, very little work has been done on self-medication in the treatment of malaria [31]. However, in the few studies that have addressed the issue of self-medication [20,32–34], or the treatment of malaria [11,35–37], the practice of self-medication with antimalarials clearly appears. The city of Bukavu shares the same reality as at the national level where the practice of self-medication with antimalarial drugs is only indirectly reported [38–40].

This study focuses on the description of the practice of self-medication during the treatment of malaria by the population of Bukavu encountered in the reference hospitals of the said city. It also presents the frequency of this practice.

2. Material and methods

2.1. Area of study

Bukavu is in the Eastern part of Democratic Republic of Congo (S 2°26'-33', E 28°49'-253'), on the Eastern valley Graben. It is one of the highest parts of the country with an average altitude of 1600 m and has a tropical mountain climate with two seasons; a wet season from September to April and the dry season from October to march. This average temperature is 20 °C. His bio-indicator vegetation is marked by the presence in some places of relict species of seasonal deciduous forests and its population estimated at around 800,000 living in 3 municipalities making a total of 32 health areas including 5 GRH, Bagira, Bukavu, Ciriri, Kadutu and Panzi [41–43].

2.2. Patients and methods

This cross-sectional descriptive study was carried out by a direct interview using a guide questionnaire, with all patients, aged over 15 year old, met in the internal medical services of these 5 health facilities in good condition speaking and having provided informed consent. The questionnaire included 20 items related to antimalarials self-medication

practices as well as socio-demographic characteristics of respondents. The sample size precalculated with Schwartz's formula ($n = z^2 p(1-p) / m^2$ where z = confidence level, set at 95%, p = prevalence of self-medication in Bukavu set at 50%, m = margin of error fixed at 5%) was 368 patients. We have nevertheless taken all the patients who met the inclusion criteria to improve the accuracy.

2.3. Ethical Considerations

Ethical approval was granted from the Department of Pharmacology in the Faculty of Pharmaceutical Sciences at the University of Lubumbashi (UNILU/FSP/DPCOL/PT/003/2017) and all participants were asked for their consent to participate in the study before being given the survey. The responses were anonymous and confidential, and the participants were informed that before start answering the questionnaire.

2.4. Statistical data analysis

Graph Pad prism version 6 software was used to analyze the data statistically. The chi-square test and odd ratio established the factors associated. A probability level $p < 0.05$ was considered significant.

3. Results and discussion

3.1. Socio-demographic characteristics of respondents

Between January and June 2018, 785 patients attended the internal medicine departments of 5 public hospitals in the city of Bukavu. Only 454 (57.8%) admit having already practiced self-medication against malaria and most of them are women (male-female sex ratio: 0,47), with an average age of 38.7 ± 8 years (extremes: 16 and 67). The respondents were from the 3 municipalities of the city of Bukavu and belonged to many professional categories; most represented by traders (39%) followed by farmer (20%). Most respondents of this study were of secondary school education level (40.5%), have an average monthly income of 95 ± 12 USD (extremes: 50 and 450 USD) and are in their majority (60%) Catholic (Table 1).

Table 1 Socio-demographic features of respondents

	Variable	Ni	F i (%)
Gender	Male	145	32
	Feminine	308	68
Marital status	Single	145	32
	Divorced	9	2
	Married	281	62
	Widower	18	4
Age class	[16 –31]	70	15.5
	[31 – 46]	247	54.5
	[46– 61]	104	22.8
	>61	33	7.2
District of residence	Bagira	127	28
	Ibanda	145	32
	Idjwi	5	1
	Kabare	9	2
	Kadutu	163	36

	Variable	Ni	Fi (%)
	Walungu	5	1
Profession	Any	114	25
	Trader	177	39
	Farmer	91	20
	Teacher	9	2
	Public employee	36	8
	Service provider	27	6
Level of study	Any	84	18.5
	Primary	116	25.5
	Secondary	184	40.5
	Higher School-University	70	15.5
Study	Another sector	403	88.8
	Health sector	51	13.2
Monthly income	≤50	100	22
	[50 – 100]	191	42
	[100 - 150]	95	21
	[150 – 200]	36	8
	[200 – 300]	23	5
	> 300	9	2
Religion	Branamist	1	0.3
	Catholic	272	60
	Kimbanguist	1	0.2
	Jehovah's Witness	2	0.5
	Muslim	14	3
	Non-practicing	5	1
	Protestant	123	27
	Revival Church	36	8

Ni= effective, Fi: frequency; N=454

3.2. Diagnosis of malaria by respondents

The surveyed people associate several signs to diagnose malaria. The first two groups of which consist of fever and vertigo (37%) followed by bitterness and fever (29%). Fever is the most common sign in each of the symptom groups (Figure 1).

Figure 1 Signs of malaria identification by subjects (n=454).

3.3. Frequency of self-medication

The frequency of self-medication varies considerably between 19.3% (GRH Panzi) and 99.7% (Ciriri). It is higher in subjects who attended GRH Ciriri (97.8%) followed by GRH Bagira (93.2%) (Table 2).

Table 2 Distribution of subjects according to the GRH where they were met

GRH	N	Ni	Fr (%)	Fa (%)
Bagira	148	138	93.2	17.6
Bukavu	214	154	71.9	19.6
Ciriri	92	90	97.8	11.5
Kadutu	61	20	32.8	2.5
Panzi	270	52	19.3	6.6
Total	785	454	NA	57.8

N: total number of subjects encountered in the GRH; Ni: number of subjects who practiced self-medication in the GRH; Fr (relative frequency of self-medication in the medium concerned ($= Ni * 100 / N$); Fa (absolute frequency of self-medication in the medium concerned ($= Ni * 100 / 785$)). NA: Not applicable. N=785.

3.4. Reasons for patients to practice self-medication and their knowledge of the risks incurred during this practice

Several reasons have pushed interviewed subjects to practice self-medication among which, search for time saving (32%) and the difficult to confide in a health professional (18%), are the most mentioned alongside a claim knowledge of effective remedies (8.5%), less mentioned (figure 2a). Although they resort to self-medication, the subjects nevertheless recognized certain risks incurred, the most cited of which were worsening side effects (22%) and inadequate treatment respectively (figure 2b).

Figure 2 Reasons for self-medication (a) and knowledge of its risks (b).

3.5. Cost of malaria treatment in modern health care and traditional medicine in Bukavu

The average cost of treating malaria over three days in the health facilities in which this study was carried out is 56 ± 15.5 USD for 7 days or 8 ± 2.2 USD per day. The highest cost is observed in two GRHs, Bukavu (80 USD) and Panzi (57 USD) and the lowest cost is observed in GRH, Ciriri (40USD). In traditional medicine, treatment for malaria is $\leq$ USD 5 and in most cases (47%), it is free (Figure 3).

Figure 3 Cost of taking in malaria in self-medication in biomedicine (a) and traditional medicine (b).

3.6. Age, instigator of first self-medication, main sources, reasons for changing medication and frequency of self-medication depending on the subjects

Almost 40% of subjects resort to self-medication whenever the need arises, and more than a third (40%) started it as a teenager between 13 and 17 years old (4a) although a large fraction do not know the exact age. The instigator of the 1st most incriminated self-medication is the parents (37%) and the main sources of information during this practice are providers in the health services (39%) and the internet (23%). People sometimes change medications for several reasons, the most mentioned of which are the lack of healing (39%) and the occurrence of unbearable effects (28%) (Figure 4).

4a. Main source of self-medication

4b. Reasons for drug change during self-medication

Figure 4 Behavior of subjects during self-medication

3.7. Antimalarial drugs used in self-medication in Lubumbashi

Eight molecules are used in self-medication, including 3 used alone and 6 combined in pairs. Quinine (91.4%) and the combination Artemether & Lumefantrine (60.4%) are the two most widely used drugs (Table 3).

Table 3 Antimalarial drug used in self-medication in Bukavu city

Active substance	Aberrant dosage	Ei	Fi (%)
α - β Arteether		20	4.4
Artemether & Lumefantrine	2x2 Tab/D W 7D	274	60.4
α - β Aartemether		30	6.6
Amodiaquine & Artesunate		10	2.2
Sulfadoxine & Pyrimethamine		178	39.2
Quinine	2x2 Tab/D W 5D	415	91.4

Tab: tablet, D: day, W: while Ei= population, Fi = frequency, n = 454

3.8. Medicines associated with antimalarials during self-medication

Thirteen drugs belonging to 9 pharmacological classes are associated with antimalarials during self-medication. Among these drugs, ascorbic acid (98.7%) followed by paracetamol (89.2%) are the most used (Table 4).

Table 4 Medicines associated with antimalarial drugs by Informants

Active substance	Class	Ei	Fi (%)
Aluminium Hydroxide-Magnesium Hydroxide-Simethicone	Antacid	10	2.2
Amoxicillin	β -Lactam	105	23.1
Ampicillin	β -Lactam	126	27.8
Ascorbic Acid	Vitamin	448	98.7
Azithromycin	Macrolide	198	43.6
Ciprofloxacin	Fluoroquinolon	228	50.2
Dextrometorphan (D-Amphetamin)	Stimulant	45	9.9
Diclofenac	Nonsteroidal Anti-Inflammatory	198	43.6
Gentamicin	Aminoglycoside	54	11.9
Mebendazole	Antiparasitic	36	7.9
Norfloxacin-Metronidazole	Fluoroquinolon-Antiprotozoal	89	19.6
Paracetamol	Analgesic-Antipyretic	405	89.2
Vitamin B (Complex)	Vitamin	129	28.4

Ei: population; Fi: frequency, n=454

3.9. Factors associated with self-medication during this study

Six factors are associated with self-medication with antimalarials in this study. These are age (31-46 years and over 61), monthly income (] 50 – 150 USD] , religion (catholic), profession (trader), Belong to a health science, prior use of traditional medicine and the pretension of knowledge of antimalarials (Table 5).

Table 5 Factors associated with anti-malarial self-medication in Bukavu.

		Self-medication			χ^2 test (Fisher's exact test)	
Gender	Factor	Yes	No	OR (IC 95 %)	^a P value	^b P value
Age	Male	146	165	1.816 (1.27 – 2.59)	0.2114	0.2114
	Female	308	164			
	[16 – 31]	70	91	0.92(0.62 – 1.40)	0.7565	
	] 31 – 46]	247	60	0.19(0.12 – 0.28)	< 0.0001	
	] 35 – 61]	104	125	0.92(0.62 – 1.40)	0.7565	
Monthly income	>61	33	36	0.91(0.53 – 1.60)	0.7834	
	] 50 – 150]	291	19	24 (13 - 45)	< 0.0001	< 0.0001
	] 150 – 200]	36	57	1.86(0.58 – 1.31)	0.195	
	] 200 – 250]	45	25	0.35(0.18 – 0.67)	0.4293	
	> 300	9	37	7.40(3.10 – 18.00)	< 0.0001	
Religion	Branamist	1	1	0.73(0.05 – 12.00)	1	0.0205
	Catholic	272	108	3.10(2.30 – 4.20)	< 0.0001	
	Kimbanguist	1	1	0.73(0.05-12.00)	1	
	Jehovah's Witness	14	5	2.08(0.74 – 5.82)	0.2389	
	Muslim	5	2	1.80(0.35 – 9.50)	0.7051	
Profession	Non-practicing	5	1	3.70(0.43 – 32.00)	0.4097	
	Protestant	123	88	1.00(0.75 – 1.40)	0.9351	
	Revival Church	36	30	0.86(0.52 – 1.43)	0.6036	
	Trader	114	10	10.76(5.54 – 20.91)	< 0.0001	< 0.0001
	Farmer	81	90	0.74(0.53 – 1.01)	0.0624	
Marital status	Teacher	9	6	1.10(0.39 – 3.11)	1	
	State worker	36	26	1.01(0.60 – 1.71)	1	
	Service provider	27	19	1.04(0.57 – 1.90)	1	
	No	114	10	10.76(5.54 – 20.91)	< 0.0001	
	Single	145	105	1.010(0.75 – 1.37)	1	0.9976
Belong to a health science	Divorced	9	6	1.10(0.39 – 3.11)	1	
	Married	281	207	0.97(0.73 – 1.30)	0.8817	
	Widower	18	13	1.77 (0.85 – 3.68)	0.1394	
	Yes	200	6	0.42(0.20 – 0.90)	0.0291	< 0.0001
	No	54	325			
Having used traditional medicine	Yes	390	1	410.5(52.27 - 3224)	< 0.0001	< 0.0001
	No	19	20			
Knowledge of antimalarials	Yes	408	10	255(74.67 – 870.80)	< 0.0001	< 0.0001
	No	4	25			

^ap: bivariate analysis; ^bp: multivariate analysis

4. Discussion

This study completes the extent, associated factors, and characteristics of self-medication during the management of malaria in people attending 5 public hospitals in the city of Bukavu between January and June 2018. The results show that the city is experiencing self-medication using both conventional and traditional medicine.

Despite respondents are informed about self-medication risks (Figure 2), many of them resort to it with a higher frequency (57.8%) than that observed in other regions such as the Middle East: 43% [44], Mbeya in Tanzania : 19% [27], Antananarivo : 22 % [45] but less than that observed from Saudi Arabia 98% [23], Jordan 100% [46] or Bangladesh 100% [47].

Fever associated to one or more other symptoms (Figure 1) was the major sign conducting people to self-diagnosed malaria; as fever is known to be a major symptom of malaria according to World Health Organization: WHO, and many other accepted guidelines for the management of malaria [48]. Self-medication with antimalarials products would be favored by the low level of education (Table 1) and the easy access to antimalarials drugs, which are supposed to be dispensed only on medical prescription. Furthermore, the various signs of self-diagnosis of malaria mentioned by interviewed (Figure 1) suggest that, the kind of malaria generally treated in self-medication concerns the simple malaria. In this context, the high use of quinine by self-medicated people (91.4%) would be considered as an irrational use of medication, as is observed in most cases of self-treatment [49–51] especially since quinine is normally used in 2nd or 3rd intention or in case of severe malaria [8,52,53].

People resorting to self-medication have given several reasons motivating them such as time saving and the low cost of self-treatment as mentioned in other previous studies [54–56]. A possible approximation can be established between the average monthly income of respondents (100 ± 8 USD) and the average cost of malaria care in biomedicine (56 ± 15.5 USD) suggesting that very likely, the use of self-medication would be very related to financial reasons which is also one of the factors associated with self-medication during this study.

The first instigator of self-medication is the parent as in some previous studies [20,23]. In a country where almost, the entire population does not have health insurance, it seems very likely that the practice of self-medication will start in the family. This familiarity is also observed in the transmission of self-medication information (Figure 4c) where the subjects mainly use the knowledge that underpins the health sciences.

The use of the Artemether-Lumefantrine (Table 3) combination is in accordance with the treatment regimens proposed by the WHO for the management of uncomplicated malaria, visibly managed by self-medication by the patients interviewed. However, cases of irrational use with non-adherence to dosage were encountered during the interview. Indeed, some informants use this combination for a period of 7 days while in the hypothesis of simple malaria, the treatment is 3 days. The same is true of quinine, the rational use of which requires administration every 8 hours [48,57].

Regarding drugs associated with antimalarials (Table 4), the high use of ascorbic acid and paracetamol can be explained respectively for the immunomodulatory and anti-free radical effects of ascorbic acid and on the other hand, by the symptomatic management of fever and headache from paracetamol during malaria infection. However, the use of the other different antibiotics (Table 4) cannot be explained except in the case of co-infection. Otherwise, it would simply be irrational use. This practice could lead to cases of high resistance against most of these different molecules which do not have an antiparasmodial spectrum.

The use of medicinal plants as the first line approach is a practice recognized by 80% of the world population for the primary health care [58–60]. In this study, we observed a high rate (390/454: 86%) of malaria self-medication with medicinal plants suggesting that the use of medicinal plants in Bukavu is popular knowledge.

Six factors are associated with antimalarials self-medication in this study: age, monthly income, religion, membership in a health science, previous use of traditional medicine and the claim of knowledge of antimalarials unlike two studies where the associated factor was education [61,62], and in accordance with the works for which the age [25,63] and previous self-medication [63,64] were associated factors.

5. Conclusion

The malaria self-treatment is a very common practice in Bukavu in both modern and traditional medicine. Several drugs reported in self-medication against malaria are used irrationally. This practice deserves special attention in the fight against malaria in DR Congo.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interests.

Statement of ethical approval

Ethical approval was granted from the Department of Pharmacology in the Faculty of Pharmaceutical Sciences at the University of Lubumbashi (UNILU/FSP/DPCOL/PT/003/2017).

Statement of informed consent

“Informed consent was obtained from all individual participants included in the study.”

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