

Original Article

A Retrospective Study to Analyze Prescription Pattern and Cost of Anti-Malarial Drugs in Indoor Malaria Patients at a Tertiary Care Teaching Hospital

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ABSTRACT

Background:To analyze prescription pattern of drugs and its cost in indoor malaria patients in year 2013-14 at a tertiary care teaching hospital.

Materials and Methods:It was a record based, retrospective, observational study carried out in PDU Medical College Rajkot Gujarat, in which prescription pattern of drugs and cost of the therapy of indoor malaria patients of the year 2013-14 were analyzed.

Results:Out of 100 patients, 59 were infected with *Plasmodium falciparum* (59%) and 38 with *Plasmodium vivax* (38%). Most of the complicated cases were found from *Plasmodium falciparum* (n = 29) than *Plasmodium vivax* (n = 2). In prescriptions, total 2238 drugs were prescribed to treat 100 cases out of which 69 were successfully treated. 67.42% of the drugs were prescribed by parenteral route (n = 1509). The average number of drugs per encounter was 6.11. Total 432 antimalarial and 259 antimicrobials drugs were used in this study. 59.02% of drugs were prescribed by generic name (n = 1322). 8.40% of drugs were prescribed from outside (n = 188). Majority of the drugs (96.20%) were from EML. Average drug cost to treat complicated *P. falciparum* case (485.68 INR) was found to be higher than uncomplicated *P. falciparum* (297.35 INR). Same applies in case of *P. vivax*.

Conclusion:This study showed that there was irrational use of anti-malarial drugs and the treatment guidelines given by NVBDCP, India were not being followed. This caused increase in cost of treatment and in long term this may even contribute to drug resistance. Interventions are necessary to improve rational drug use in our facility.

Key words:Malaria, Prescription pattern, Cost

INTRODUCTION

Malaria is a disease caused by infection with single celled protozoan parasite of the genus plasmodium and five plasmodium species are known to infect humans- *P. falciparum*, *P. vivax*, *P. ovale*, *P. knowlesi* and *P. malariae*. Of these, majority of cases reported are due to infection with *P. falciparum* and *P. vivax*. *P. falciparum* is associated with the most severe form of the disease. [1]The transmission of the malaria infection occur via the bite of plasmodium-infected female anopheles mosquito. The infective form is sporozoite which passes through pre-erythrocytic phase in liver followed by erythrocytic phase in red blood cells [2]; the latter is responsible for clinical manifestation of malaria.

According to Annual malaria report 2014 by WHO, an estimated 198 million cases of malaria occurred

worldwide and 0.584 million malaria deaths were reported, most of which were from sub-Saharan African region. 55% of total malaria cases reported from south-east Asia region were from India which is the highest proportion of cases from any country in this region. From 2009-2013, cases reported of *P. falciparum* were 55% and *P. vivax* were 45% in India. [3]Malaria is a public health problem in several parts of India and about 95% population in the country resides in malaria endemic areas. The provisional data from the report of National Vector Borne Disease Control Program India suggest that in year 2014, total malaria cases reported were 1.10 million, of which the cases due to *P. falciparum* were 0.72 million and total deaths reported were 561.[4]Anti-malarial drug resistance is a major public health problem which hinders the control of malaria. In India resistance of *P. falciparum* to chloroquine, the cheapest and the most used drug was first reported in 1973 and then kept increasing and now reported at 118 PHC of 80 districts across

the country.[5]The pattern of prescriptions for a specific disease provide evidence based guidance for making policy decisions for treatment regimen at various levels of healthcare as well as provide logical background for determining the rationality of drug use. These kind of research studies conducted in the inpatient settings are effective tools that helping evaluating the drug prescribing trends, efficiency, and cost effectiveness of hospital formularies. [6]

Malaria being a major health problem in the country as well as the increasing emergence of resistance to the conventional anti-malarial therapy, it is necessary to check for the prescribing pattern of the anti-malarial drugs in inpatient settings in the health care system. It is essential to critically analyze the current hospital drug policies of malaria and to make recommendations based on various guidelines to improve upon the current drug usage pattern in the future, if needed. As India is a developing country, it is necessary to check for the cost of the therapy which is the financial burden on the health care system and ultimately to the community and the country. Keeping this in view, we conducted this study in our tertiary care hospital with the objective of studying pattern of drug use and cost of drug treatment in malaria patients in inpatient setting.

MATERIAL AND METHODS

Ethical Approval:

Ethical Approval was taken from Institutional Ethics Committee, P.D.U. Medical College, Rajkot, Gujarat

Study Design:

Retrospective, observational, single centric study

Study Settings:

P.D.U. Medical College, Rajkot, Gujarat; a tertiary care teaching hospital

Study Methodology:

In this retrospective record based study, case files of hundred patients, aged 18 and above of either sex with confirm diagnosis of malaria, were randomly selected from medical record section of the PDU Govt. Medical College, Rajkot. Pregnant and pediatric patients with malaria were excluded from the study. The cases were selected in the time frame of year 2013-14.

The basic demographic data (age, sex, region), duration of hospital stay, outcome and prescription pattern of malaria patients- inclusive of name of the drug, dosage schedule (form, route, and frequency), and duration of treatment, were recorded in case record form. The treatment was compared with that of given in National Drug Policy on malaria 2013 which is included in NVBDCP (National Vector Borne Disease Control Program). The cost of the antimalarial drugs prescribed was analyzed based on the number of drugs given to the patient during

treatment with the help of price list of drugs obtained from the hospital pharmacy.

Rationality of prescriptions was evaluated by using the WHO drug prescribing indicators, that is, (a) average number of drugs per encounter, (b) total antimalarial drugs used, (c) total anti-microbial drugs used, (d) No. of antimicrobial combinations used, (e) No. of anti-malarial combinations used, (f) total injections used, (g) No. of drugs used by generic name, (h) No. of vitamins prescribed, (i) No. of drugs prescribed from outside, that is not from Govt. supply, (j) No. of drugs prescribed from National List of Essential Medicines 2011.

Results

a) Analysis of drug utilization pattern:

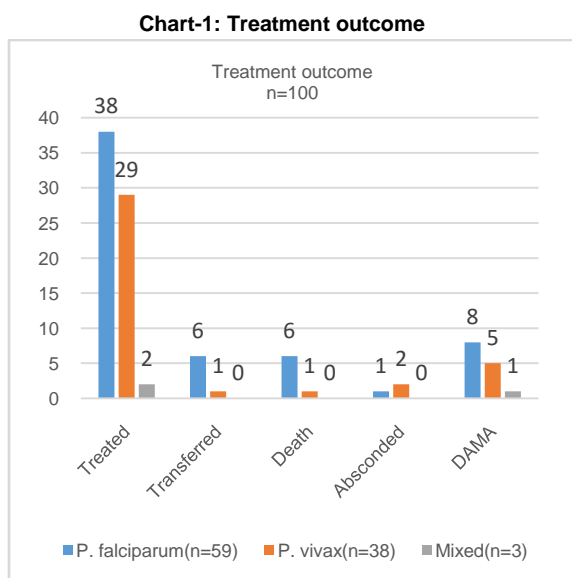
Out of 100 patients 62 were males (62%) and 38 were females (38%). Maximum patients were from age group 18-35, 54 out of 100. (Table 1). 51 patients were from rural area (51%) and 49 from urban area (49%). Average duration of hospital stay was 3.5 days.

Among the malaria cases, maximum cases of were Plasmodium falciparum (59%) followed by Plasmodium vivax (38%) and mixed infection (Plasmodium falciparum + Plasmodium vivax) (3%). Among P. falciparum infection 29 cases were of complicated malaria (49.15%) and 30 cases were of uncomplicated malaria (50.84%). Among P. vivax malaria 2 cases were of complicated malaria (5.2%) and 36 cases were of uncomplicated malaria (94.73%). All the cases with mixed infection were complicated. (100%). From total 100 cases 66 cases were complicated (66%) and 34 cases were uncomplicated (34%) [Table-1]

Table 1: Species wise distribution of malaria cases

Types (n=100)	Un-complicated	Complicated	Total
P. falciparum	30 (30)	29(29)	59(59)
P. vivax	36 (36)	2(2)	38(38)
Mixed	0	3(3)	3(3)
Total	66 (66)	34(34)	100(100)

The treatment outcome is illustrated in chart-1. The results are: out of 100 patients 69 cases were treated [P. falciparum-38 (55.07%); P. vivax-29 (42.04%); Mixed-2 (2.89%)], 7 were transferred to other hospital [P. falciparum- 6 (85.71%); P. vivax-1 (14.28%); Mixed-0], 7 died [P. falciparum- 6 (85.71%); P. vivax-1 (14.28%); Mixed-0], 3 absconded the treatment [P. falciparum- 1 (33.3%); P. vivax-2 (66.6%); Mixed-0] and 14 were discharged against medical advice (DAMA) [P. falciparum- 8 (57.14%); P. vivax-5 (35.71%); Mixed-1 (7.14%)].



b) Cost of drug treatment:

The cost was calculated on the basis of the list of drug price obtained from the government hospital pharmacy and the results showed that the price of treatment of mixed infection was highest which was 804 Rs/patient, followed by complicated P. falciparum malaria 485.68 Rs/patient, Complicated P. vivax 368 Rs/patient, uncomplicated P. falciparum malaria 368 Rs/patient, uncomplicated P. vivax 146.50 Rs/patient. [Table-2]

Table2: Cost analysis [Rs/patient]

Type of infection	Uncomplicated	Complicated
P. falciparum	297.35	485.68
P. vivax	146.59	368
Mixed	-	804

c) Analysis of Prescription Indicators:

Analysis of prescriptions using WHO prescribing indicators revealed that for 100 patients, total drugs prescribed were 2238; total antimalarial prescribed were 432 (19.30%); Total antimicrobial prescribed were 259 (11.57%); Antimicrobial combinations were 7; Antimalarial combinations were 37; total injections were 1509 (67.42%); Drugs by generic name were 1322 (59.07%); Average number of drugs per prescription were 6.11; 294 vitamins were prescribed; 96.20% drugs were prescribed from NEML 2013 and 8.40% drugs were prescribed from outside Govt. supply.[Table-3]

DISCUSSION

In our study 100 indoor patients of malaria were analyzed. Among them 59% of patients were infected with P. falciparum which is a more serious form of infection. Similar results were found in study done by Singh AK et al showing 60% of Patients

infected with P. falciparum among total malaria cases.[7]

Table 3: Analysis of prescriptions using WHO prescribing indicators

Prescribing indicators	No.	PF	PV	Mixed
Total drugs	2238	1427 (63.76)	731 (32.66)	80 (3.57)
Total antimalarial	432 (19.30)	264 (11.79)	152 (6.80)	16 (0.71)
Total antimicrobial	259 (11.57)	170 (7.59)	76 (3.40)	13 (0.58)
Antimicrobial combination	7 (0.31)	7 (0.31)	0	0
Antimalarial combination	37 (1.65)	27 (1.20)	4 (0.18)	6 (0.27)
Total injections	1509 (67.42)	1034 (46.20)	414 (18.50)	61 (2.72)
Total drug by generic name	1322 (59.07)	746 (33.33)	531 (23.73)	45 (2.01)
Average number drugs per prescription	6.11	6.19	5.98	6.1
Vitamins	294 (13.13)	192 (8.57)	89 (3.97)	13 (0.58)
Drugs from NEML 2013	2153 (96.20)	1370 (61.22)	709 (31.68)	74 (3.30)
Drugs from outside Govt. supply	188 (8.40)	146 (6.52)	26 (1.16)	16 (0.72)

[Values in parenthesis shows percentage with reference to total number of drug 2238]

This is also in accordance with KumarA et al., suggesting a rampant rise in the proportion of P.falciparum in India, from 44% of all confirmed cases in 2005 to 54% in 2009[8], and it may soon reach 59%[9].Kumar A et al., also found that in spite of a rise in malaria cases, India is making really slow progress regarding control of malaria in comparison to other countries [8].

In our study the distribution of rural and urban population were almost equal respectively 51% and 49%. Earlier Malaria was considered as a disease of rural areas but now malaria is spreading in urban population also, may be associated with construction activity and migrant workers. [10]Regarding the outcome of the treatment, 69% patients were treated successfully and death of 7 patients occurred out of which 6 died due to P. falciparum infection. The death rate in our study was 7% which is higher compared with the study done by Halchar S et al., in which the death rate recorded was 1.35%. [11] The percentage of antibiotic prescribing in the malaria patients was high (12%) which is not indicated in majority of patients with malaria, and also not indicated in national drug policy for malaria 2013 given by

NVBDCP.[12] In majority of patients the Guidelines were not being followed. Average duration of hospital stay was 3.5 days and average number of drugs prescribed per prescription were 6.1. The cost of the therapy was relatively higher for P. falciparum malaria than P. vivax malaria, mostly attributed to more severe form of the disease and longer duration of hospital stay. It was as high as 485 Rs/patient for complicated P. falciparum malaria. Increased cost of the therapy was also due to irrational use of antibiotics as well antibiotic combinations given to the patients with complicated malaria. All these expenses lead to increase economic burden on the health system as well as society and for developing county like India these non-productive health expenses are not desirable. 59.07% drugs were prescribed by generic name but the practice of generic prescribing should be encouraged. This strategy is also in part helps in cutting down the cost of the therapy. Many governments now strongly support the production and clinical use of generic medicinal products in place of reference brand-name drugs. [13] Therefore, with the help of this kind of research, we can facilitate the rational use of drugs in populations.

CONCLUSION

This study showed that there was irrational use of anti-malarial drugs and the treatment guidelines given by NVBDCP, India were not being followed. This caused increase in cost of treatment and in long term this may even contribute to drug resistance. Interventions are necessary to improve rational drug use in our facility with drug resistance monitoring and a complete analysis of data across institution. This study highlights the need for rationalizing drug therapy and also there is need to prevent inappropriate overuse of antibiotics where it is not indicated.

Limitations

Study carried out with purposive sampling of 100 sample size. Multicentric study having more sample size is a way forward for future study.

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