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Original Research Article

Assessment of the Cost Difference of Various Branded and Generic Antimalarial Drugs: Cost Minimization Analysis

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Abstract

Aim: To assess the cost difference of various branded and generic antimalarial drugs available in the Indian market.

Material & Methods: The minimum and maximum cost in rupees (INR) of an antimalarial drug manufactured by different pharmaceutical companies in the same dose strength was noted among all the above sources.

Results: Highest cost ratio was seen with Chloroquine 500 mg, Mefloquine 250 mg and Sulfadoxine – Pyrimethamine 500+25 mg. Lowest cost ratio was seen with Quinine 600 mg, Chloroquine 250 mg and Sulfadoxine – Pyrimethamine 750+37.5 mg.

Conclusion: This study reveals the need to further improve the drug price regulatory mechanism concerning anti-malarial available in India to improve patient compliance and thus cure rates of malaria.

Keywords: Anti-malarial drugs, Compliance, Cost ratio, Percent cost variation

Introduction

Despite being a largely preventable and treatable disease, malaria is responsible for an estimated 800,000 deaths globally each year [1], with the majority of morbidity and mortality occurring in young children.

In addition to its impact on health, malaria imposes a heavy economic burden on individuals [2] and entire economies [3]. In response to calls for widespread control and elimination of malaria and the challenge of meeting the Millennium Development Goals, there has been a rapid scale-up of existing effective anti-malaria interventions, in particular insecticide treated mosquito nets (ITNs) including long-lasting insecticidal nets (LLINs) [4-7] , coupled with efforts to improve access to prompt and effective treatment [8,9].

During the latter parts of nineteenth and early twentieth century's, nearly one-fourth of India's population suffered from malaria, particularly in the states like Punjab and Bengal [10]. In the late 1960s malaria cases in urban areas started to multiply. As a result, in 1976, 6.45 million cases were recorded by the national

malaria eradication programme (NMEP), highest since resurgence.

The consideration of the cost of treatment is one of the important aspects of health economics. The cost of the acquisition of medicines is one of the major costs that the patient has to bear. Cost related to poor patient compliance is a significant problem throughout the world. However, the physicians tend to prescribe branded preparations over generic ones as they assume that the branded preparations are more superior to generic preparations of the same drug [11].

The differential pricing of medicines has been taken care of by the Government of India at least to some extent through periodic notification of Drug Price Control Order (DPCO) which fixes the prices of certain drugs that are essential and makes them affordable [11]. This in turn is implemented by the National Pharmaceutical Pricing Authority (NPPA) [12].

Hence, the present study was undertaken to analyze the cost difference of various anti-malarial drugs available in the Indian market and to highlight the cost variation among different branded and generic preparations available so that whenever possible a cheaper cost-effective medicine can be prescribed to improve patient compliance and to reduce the medicine cost to the patient as well as the total health care costs.

Material & Method:

The prices of various anti-malarial drugs were recorded from sources such as CIMS (Current Index of Medical Specialities). The minimum and maximum cost in rupees (INR) of an antimalarial drug manufactured by different pharmaceutical companies in the same dose strength was noted among all the above sources. The cost of 10 tablets/capsules, one bottle of syrup/drops, and that of one ampoule/vial were calculated. For artemisinin-based oral formulations cost was calculated for 3 days as per WHO and NVBDCP recommendations.

The cost ratio is defined as the ratio of the maximum cost of the drug to the minimum cost of the drug. It was calculated for all the included anti-malarial drugs. This indicates the cost inflation in the prescribed drug with the same chemical compound but with different commercial brands. Cost ratio expresses the cost of drugs in proportion to the costliest and cheapest brand of the drug available in the market. Fixed drug combinations were also evaluated in the same manner as above.

Results:

Cost distribution of various oral antimalarial formulations of antimalarials was given by Table 1. Among the 13 oral formulations there is a gross difference between minimum and maximum cost in most of the formulations. Highest cost ratio was seen with Chloroquine 500 mg, Mefloquine 250 mg and Sulfadoxine-Pyrimethamine 500+25 mg. Lowest cost ratio was seen with Quinine 600 mg, Chloroquine 250 mg and Sulfadoxine-Pyrimethamine 750+37.5 mg.

Table 2 Shows cost distribution of various artemisinin based oral formulations. Among the 14-artemisinin based oral formulations there is a significant difference between minimum and maximum cost in most of the formulations.

Cost ratio of various artemisinin based oral formulations were given by Table 3. Highest cost ratio was seen with Artesunate-Sulfadoxine-Pyrimethamine 100+500+25 mg, Artesunate 100 mg and Artesunate 50 mg. Lowest cost ratio was seen with Artemether 40 mg, Arteether-Lumefantrine 20+120 mg, Artesunate-Sulfadoxine-Pyrimethamine 200+750+25 mg and Artesunate-Mefloquine 100+200 mg.

Percentage of cost variation of various parenteral antimalarial formulations is

given in Table 4 respectively. Highest percentage of cost variation was seen with Arteether 150 mg, Quinine 300 mg and Quinine 600 mg. Lowest percentage of cost variation was seen with Artesunate 120 mg, Artemether 80 mg and Artesunate 60 mg.

Table 1: Cost distribution of various oral antimalarial formulations

Drug	Formulation	Strength	No of tablets	Minimum cost(rs)	Maximum cost(rs)
Chloroquine	Tablet Tablet	250 mg 500 mg	10 10	34 5.27	56 253
Amodiaquine*	Tablet	200mg	10	5	-
Mefloquine	Tablet Tablet	250 mg 300 mg	10 10	14.99 26.31	678.2 680.2
Quinine	Tablet Tablet	600 mg 2.5 mg	10 10	78.36 8.20	133.71 21.40
Primaquine	Tablet Tablet	7.5 mg 15 mg	10 10	13.3 7.8	45.81 60.29
Sulfadoxine	Tablet	500 mg + 25 mg	10	9.2	362
Pyrimethamine	Tablet	750 mg + 37.5 mg	10	23.81	45.72
Proguanil	Tablet	100 mg	10	38.9	80.29
Sulfamethoxazole-	Tablet	500 mg + 25 mg	10	26.7	197.19

Table 2: Cost distribution of various artemisinin based oral formulations

Drug	Formulation	Strength	No of tablets	Minimum Cost(Rs)	Maximum Cost(Rs)
Arteether*	Tablet	50 mg	6	115.01	-
Artemether	Capsule Tablet	40 mg 50 mg	6 6	107.92 24	130.28 209.07
Artesunate	Tablet	100 mg	6	121	1200
Artemether-Lumefantrine	Tablet Tablet	80 mg + 480 mg 20 mg + 120 mg	6 6	45.0 52	228.62 111.3
Arteether-Lumefantrine	Tablet Tablet	80 mg + 480 mg 20 mg + 120 mg	6 6	55.81 65.92	180.82 77.72
Artesunate Sulfadoxine Pyrimethamine	Tablet Tablet	100 mg + 500 mg + 25 mg 200 mg + 750 mg +25 mg	3 3	14.22 182.12	190 300
Artesunate-Amodiaquine*	Tablet	100 mg + 300 mg	6	117.92	-
Artesunate Mefloquine	Tablet	100 mg + 200 mg	6	298.72	480
Arterolane-Piperaquine*	Tablet Tablet	150 mg + 750 mg 37.5 mg + 187.5 mg	3 3	197 78	- -

Table 3: Percentage of cost variation of various artemisinin based oral formulations

Drug	Strength	Percentage of cost variation
Arteether	50 mg	-
Artemether	40 mg	20.62 %
Artesunate	50 mg 100 mg	769.27 % 900.21 %
Artemether-Lumefantrine	80 mg + 480 mg 20 mg + 120 mg	385.72 % 114.81 %
Arteether Lumefantrine	80 mg + 480 mg 20 mg + 120 mg	230.42 % 19.80 %
Artesunate Sulfadoxine-Pyrimethamine	100 mg + 500 mg + 25 mg 200 mg + 750 mg + 25 mg	1168.91 % 61.62 %
Artesunate-Amodiaquine	100 mg + 300 mg	-
Artesunate-Mefloquine	100 mg + 200 mg	60.55 %
Arterolane-Piperaquine 14	150 mg + 750 mg 37.5 mg + 187.5 mg	- -

Table 4: Percentage of cost variation of various parenteral antimalarial formulations

Drug	Strength	Percentage of cost variation
Chloroquine	40mg	156.82 %
Quinine	300 mg 600 mg 75 mg	1260.62% 1052.39 % 822.30 %
Arteether	120 mg 150 mg	- 2372.8 %
Artemether	80 mg	37.73 %
Artesunate	60 mg 120 mg	135.83 % 11.74 %
Alpha- Beta Arteether	150 mg	280.46 %

Discussion:

People living in developing countries pay heavy cost of medicines. In India, more than 80% health financing is borne by patients. [13-15] The situation becomes more complex due to the presence of number of brands with variety of names and prices. [16] The price variation assumes significance when the cost ratio exceeds 2 and percentage cost variation exceeds 100. By this fact the above analysis showed that there is not much significant price variation among oral antimalarial drugs.

Care must be taken when comparing the cost-effectiveness of prevention and treatment-based interventions, as the denominator populations at risk may not be directly comparable due to differences in age, location, or exposure to malaria. Preventive interventions are administered to individuals before future disease status is known, (e.g. an ITN may be delivered to a person who would not have become infected anyway) whereas treatment with ACT is administered to an individual conditional on them experiencing an episode of malaria and coming into contact with a health facility where a study is

being undertaken. In studies of the cost-effectiveness of preventive interventions, comparisons will often be made between a population receiving the intervention and a control population not receiving the intervention. Such a study design is more difficult for treatment-based interventions which must always compare the treatment under investigation with an alternative treatment. [17]

The primary studies of costing data identified estimated the costs of single interventions in the absence of other anti-malaria interventions, with the exception of a study by Picard et al [18]. However estimates of the costs and cost-effectiveness of combined interventions were possible in model-based studies [19, 20]. Given the renewed enthusiasm for large-scale malaria control and elimination efforts, control programmes based on multiple interventions are becomingly increasingly common [21-22]. Anti-malaria interventions will increasingly be deployed as part of wider health system strengthening packages leading to possible economies of scope: witness the IPTi studies by Manzi et al [23] where the cost of a course of intermittent preventive treatment was reduced due to its administration alongside the already existing (and therefore not an additional financial cost) Expanded Programme on Immunization.

Injectable antimalarials are often the choice of drug when dealing with critically ill malaria patients specially when suffering from complicated malaria. So, such significant price variation creates economic burden on poor patients. This often leads to non-compliance or abrupt cessation of treatment which adds on the morbidity and mortality due to malaria. The treating physician should be made aware of the cheapest drug available among the various brands so that the patient bears lesser burden of treatment cost. Costs of drug are controlled by the drug cost control order 2013 (DPCO). [24]

An expensive brand can cost a patient more than ten times the price of a cheaper brand of the same drug. This reflects a serious concern in the context of India where 50-90% of costs of medicines are still borne by the patient themselves. This high cost of purchasing medicines is a significant factor leading to poor compliance. [25-16] Clinician's false belief of effectiveness or superiority of branded drugs over generic drugs often results in prescription of costly drugs, when cheaper alternatives are readily available. [27]

Conclusion:

A transparent evidence base on the costs and cost-effectiveness of malaria control interventions is provided to inform rational resource allocation by donors and domestic health budgets and the selection of optimal packages of interventions by malaria control programmes.

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