

Antiplasmodium and chloroquine resistance reversing effects of embelin against Plasmodium falciparum K1

ABSTRACT

Background: Emergence of chloroquine (CQ) resistance among different strains of Plasmodium falciparum is the worst catastrophe that has ever perplexed efforts to eradicate malaria. This behooved the scientists to search for new alternatives or sensitizers that augment its action. Method: In this experiment, the potential of embeline, a quinonoid phytochemical obtained from the Indian plant Embelia ribes, to inhibit the growth and sensitize CQ action was screened using SYBRE green-I based drug sensitivity assay and isobologram technique respectively. Its effect on both RBCs and Vero cells stability and RBCs fragility was screened to assess its safety. To depict its molecular mechanism, its effect on hemozoin formation and the new permeation pathway (NPP) of the host RBCs membrane were screened. Furthermore, its anti-oxidant activity was measured using the conventional in vitro tests and its molecular characters were obtained using Molispiration program. Results: The results showed that its antiplasmodial effect was weaker than CQ but synergism was obtained when they were combined together. Its low anti-plasmodial potency and poor selectivity toward RBCs reduces its eligibility to be introduced as an antimalarial. Nevertheless, it synergized CQ at a concentration within the safe limit. Embelin did not produce any impact on NPP but its impact on hemozoin formation was pronounced. Its antiplasmodium effect can be attributed to the latter or to its effect on RBCs membrane but further investigations are required to detect its CQ resistance. Conclusion: Overall, embelin is not ideal to be used as antiplasmodium but can be suggested as CQ resistance reversing agents.

Keyword: Chloroquine; Embelin; Isobologram; Plasmodium falciparum; SYBR green-I