



Research Article

COMPARATIVE STUDY OF *OCIMUM SANCTUM* OIL AND ANTIMALARIAL TABLETS CONTAINING CHLOROQUINE PHOSPHATE

Kulshreshtha Priyanka*, Kulshrestha Sugandha, Rathor Neha, Shukla R.N.

P.G. Department of Applied Chemistry, Samrat Ashok Technological Institute, Vidisha, (M.P.), India

*Corresponding Author Email: kulshrestha.priyanka7@gmail.com

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ABSTRACT

In traditional system of medicine, *Ocimum sanctum* (known as Tulsi in Hindi), have been recommended for treatment of many diseases such as malaria, diarrhoea, eye diseases, cold disease etc. In this study, the *Ocimum sanctum*, collected from vidisha region was extracted by steam distillation process. The percentage yield of oil was 0.7 % with specific gravity was 0.92 g/ml. GC-MS analysis of oil showed the percentage of compounds i.e. Eugenol, cyclopentane and caryophyllene and their GC retention times were 5.2 minutes, 5.4 minutes and 6.1 minutes respectively. The chemical equivalence of drugs plays an important role in the quality assurance. In comparative analysis of anti malarial tablets, containing Chloroquine phosphate (CQP), five samples A-E were analysed qualitatively and quantitatively. By experiment and physicochemical test, it was observed that almost all the results are near to the standard values. This brings the need for drug agencies to monitor the quality of the drugs to check adulteration. The result of the study showed that *Ocimum sanctum* oil has well anti malarial activity with respect to chloroquine phosphate.

Keywords: *Ocimum sanctum* oil, GC-MS analysis, Anti malarial activity, Eugenol, CQP

INTRODUCTION

Among the plants known for medicinal value, the plants of genus *Ocimum* belonging to family Labiateae are very important for their therapeutic potentials.¹ Species of genus *Ocimum* which grow in different parts of the world and are known to have medicinal properties. *Ocimum sanctum*, known as 'Tulsi' in Hindi and 'Holy Basil' in English, is an erect soft hairy aromatic herb or under shrub found throughout India. Tulsi plant is a shrub reaching a height of 0.5 to 1.5 m. The leaves are 2-4 cm in length.² Essential oil of tulsi has been reported to 100 % larvical activity against the mosquitoes. Trials have shown excellent anti malarial activity. Its extracts have marked insecticidal activity against mosquitoes. Its repellent action lasts for about two hours. Eugenol is main constituent and it is responsible for mosquito repellent property.³ It is equally effective in other therapeutic uses which are- antimicrobial, anti stress, anti diabetic, anti allergic, and several other diseases.⁴ Chloroquine phosphate is an anti malarial Active Pharmaceutical Ingredient (API) in drug. Chloroquine is active against the erythrocytic forms of *Plasmodium vivax*, *Plasmodium malariae*, and *Plasmodium falciparum*.⁵ In this study, selected anti malarial tablets of different brands containing CQP (Chloroquine phosphate) from pharma stores of Vidisha were chemically evaluated and essential oil extracted by steam distillation of *Ocimum sanctum* in our PG laboratory and compare with CQP.

MATERIALS AND METHODS

Fresh leaves of *Ocimum sanctum* collected from Vidisha region, for extraction of oil by steam distillation process. The process of extraction carried out for six hours. GC-MS analysis were performed in IISER, Bhopal, India using a Agilent Technologies GC clauses 500 system and Gas chromatography interfaced to a mass spectrometer (GC-MS) equipped with a Elite-1, fused silica capillary column (30 m × 0.25 mm ID × 1 μ df, composed of 100 % Di methyl polysiloxane) For GC-MS detection, an electron ionization system with ionizing energy of 70 e.v. was used. Helium gas (99.999 %) was used as the carrier gas at constant flow rate 1 ml/min and an injection volume of 2 μl was employed (split ratio of 10 : 1) injector temperature 250°C; ion-source temperature 280°C. Mass spectra were taken at 70 e.v.; total GC running time was 13 minutes⁶. Five brands of commercially available anti malarial tablets were purchased from the pharma stores of vidisha which contain CQP as API. The samples were marked as A to E, which were analysed in Qualitative and Quantitative test according to British pharmacopeia and Indian pharmacopeia. Qualitative analysis test including melting point test, pH range determination, and colour identification test.⁷ Quantitative analysis included percentage assay of tablets and percentage phosphate determination by Spectrophotometer.⁸

Table 1: *Ocimum sanctum* oil components with their molecular masses and retention times

S. No.	Compound	Molecular mass	GC Retention time
1.	Eugenol	164.1	5.2
2.	Cyclopentane	107.1	5.4
3.	Caryophyllene	204.2	6.1

Table 2: Results of samples A-E in Qualitative and Quantitative analysis

Object	Identification	pH	M.P.	Assay	Percentage of phosphate
Standard	Presence of phosphate	3.5-4.5	Below 200°C	95-105 %	20-40 %
Sample A	+	4.2	195°C	102.04 %	20 %
Sample B	+	4.0	194°C	92.08 %	35 %
Sample C	+	4.1	198°C	95.02 %	30 %
Sample D	+	4.0	193°C	97.06 %	25 %
Sample E	+	3.6	193°C	78.90 %	38 %

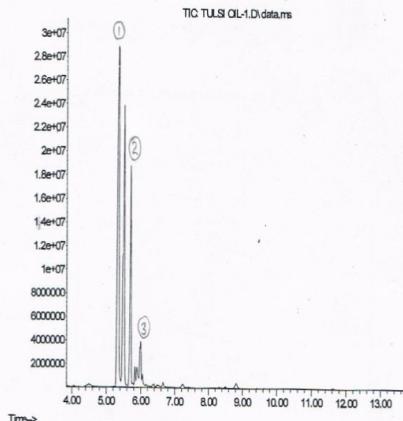
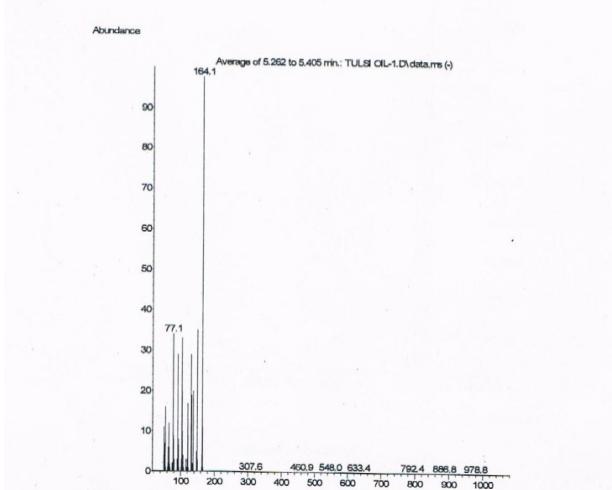
Figure 1: GC spectra of *Ocimum sanctum* oil components

Figure 2: Mass spectra of Eugenol (M.W.-164.1)

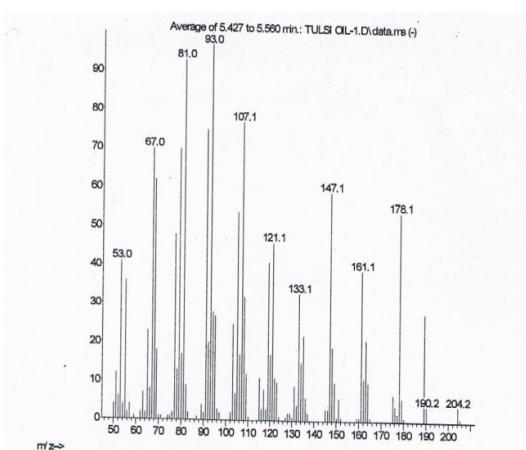


Figure 3: Mass spectra of cyclopentane (M.W.-107.1)

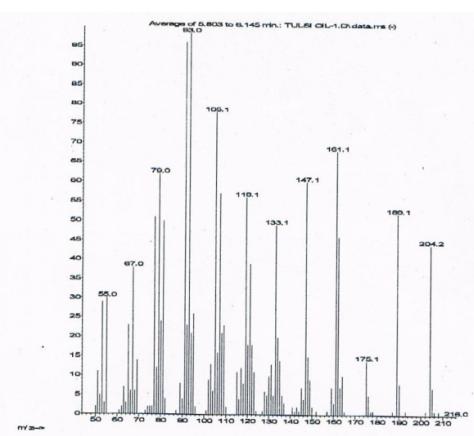


Figure 4: Mass spectra of Caryophyllene (M.W. – 204.2)

RESULT AND DISCUSSION

In study of *Ocimum sanctum* oil, extracted by steam distillation process, the calculated percentage yield 0.7 % and specific gravity is 0.92 g/ml. Analysis of the oil sample was carried out and important constituents of oil were identified with the help of their GC spectra (Figure 1) and MASS spectra (Figure 2-4). Three compounds were identified along with their GC retention times, (Table 1) which are – 1. Eugenol 2. Caryophyllene 3. Cyclopentane.

The high peak in GC graph show that Eugenol found in maximum quantity in *Ocimum sanctum* oil. Eugenol is main constituent of Tulsi oil and has an anti malarial and antibacterial activity. In Qualitative analysis, Identification test was done by confirming the presence of API (Active Pharmaceutical Ingredient). We identified the presence of CQP by performing the phosphate test on five samples A-E

All samples give yellow precipitate, which confirmed the presence of API-CQP according to Indian Pharmacopoeia (Table 2). The standard value of pH range is 3.5-4.5 of CQP according to British pharmacopeia and samples A-E showed pH range between 3.7-4.2. Thus all samples showed results within the prescribed limit (Table 2). The standard melting point of CQP is about 200°C according to British pharmacopoeia. Result showed that all samples A-E melt below 200°C (Table 2). Hence all samples are positively identified in qualitative analysis. In Quantitative analysis percentage assay according to Indian pharmacopoeia and percentage phosphate in the samples by spectrophotometer was determined. The standard value of percentage assay was 95-105 %. A, B, C, D found in limit value but sample E showed lower value in limit (Table 2). Percentage phosphate of all samples was found within limit of 20-40 % (Table 2).

The results also showed that there is a need for drug regulatory agencies to conduct regular monitoring of drugs, to check substandard medicines in pharma.

CONCLUSION

The Eugenol present in tulsi is the main anti malarial agent. The GC-MS study of tulsi showed the presence of Eugenol in greater amount. Different anti malarial brands of drugs present in market containing CQP were analysed for their chemical purity which indicate the need of regular monitoring of these drugs. The Eugenol and CQP both possess the anti malarial activity. Eugenol is the traditional medicine for malaria having 100 % larvacidal activity against mosquitoes and no side effect in comparison to allopathic medicine. Hence Eugenol could be a better option to treat malaria in its initial stage.

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