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**GC-MS Analysis of Pattru Chooranam - Effective  
formulation for Sinusitis as an External Application**

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**Abstract**

Our current study deals with phytochemical analysis of *Pattru chooranam*, which is been actively used for the treatment of sinusitis by folk traditional healers in the region of Kumbakonam (Dt), Tamil Nadu. The presence of Phytochemicals in *Pattru chooranam* is analysed by the GC-MS analysis. The results shows the presence of some of the important chemicals like Eguenol, Zingiberine, Piperine, Lauric acid, Elemenone, Germacrone, Spathulenol, etc. These chemical compounds have anti-inflammatory, antioxidant and Local anaesthetic activity. The presence of phytochemicals in *Patruchooranum* and their efficacy denotes *Patru chooranam* is very effective to treat Sinusitis.

**Keywords:** *Pattru chooranam*, GC-MS, Sinusitis, Folklore Medicine.

**Introduction**

Medicinal plants have been used for centuries and are appreciated for their multiple effects in a wide variety of ailments. In recent decades concentration on medicinal plants has increased dramatically not only in our country but also globally <sup>[1][2]</sup>. For this reason, the World Health Organization (WHO) encourages and promotes drugs from natural resources. Today scientist discovering many Medical plants, because they are the major sources for drug discovery and development, the phytochemicals which are the secondary metabolic substance present in it which paws way for new potential therapeutic effects. New drugs derived from pure sources has available throughout the last couple involving years <sup>[3-8]</sup>. Many new drugs have obtained approval for curing many chronic disease and the management involving cancer, neurological diseases, infectious problems,

cardiovascular and metabolic diseases, immunological, inflammatory related diseases, also which encompass many of a normal human diseases. *Pattru Chooranam* used for externally to treat Sinusitis (Peenism in Siddha). It is characterized by reddening of nasal mucosa (a condition in which the cavities around the nasal passages become inflamed), rhinitis, headache, and intermittent expulsion of mucous, purulent or bloody sputum. The patient complaints such as burning sensation, itching, redness with watery discharge from nasal mucosa and eyes, irritation of ears with obstruction, severe headache with dyspnoea and rhinitis. Sinusitis is due to intake of cold water, exposure to cold climate, inhalation of smoke or other polluting gases, sleeplessness, talking in high pitched voice etc mentioned in Siddha system. *Pattru chooranam* is one of the effective formulations

useful to treat sinusitis as an external application. Presence of chemical compounds in *Patru chooranam* was analysed through GC-MS.

## Materials and Methods

### Composition of *Patru chooranam*

1	Turmeric: ( <i>Curcuma longa</i> )	17.39%
2	Kasturi Turmeric: ( <i>Curcuma aromaticus</i> )	17.39%
3	Borax dehydrates	8.6%
4	Benzoin Resin: ( <i>Styrax tonkinensis</i> )	8.6%
5	Pepper: ( <i>Piper nigrum</i> )	4.34%
6	Dried Ginger: ( <i>Zingiber officinale</i> )	4.34%
7	Nutmeg: ( <i>Myristica fragrans</i> )	4.34%
8	Ajwain: (Carom) ( <i>Trachyspermum ammi</i> )	4.34%
9	Clove : ( <i>Syzygium aromaticum</i> )	4.34%
10	Camphore: ( <i>Cinnamomum camphora</i> )	4.34%
11	Long pepper : ( <i>Piper nigrum</i> )	4.34%
12	Dill ( <i>Peucedanum grande</i> )	4.34%
13	Cinnamimum bark ( <i>Cinnamoum zoylanicum</i> )	4.34%
14	Tailed pepper ( <i>Piper cubeba</i> )	4.34%
15	Five-leaved chaste tree ( <i>Vitex negundo</i> )	4.34%
16	Lime juice: ( <i>Citrus limon</i> )	Required Quantity.

### Procurement of Raw Drugs:

The above Ingredients are procured from local market Chennai.

### Preparation procedure of *Patru chooranam*

The above ingredients are powdered thoroughly and mixed with lime juice to make as a paste. Then the paste was dried in sunlight until it becomes dry.

### Usage

Dried *Patru chooranam* will be mixed with water to make as paste and applied externally on Forehead and maxillary region for Sinusitis, Persistent headache due to Cold.

### Preparation of solvent extraction

The *Patru chooranam* was weighed about 14.28g. Then the weighed powder was subjected to maceration using different solvents methanol and chloroform for 48 hours. The collected extracts were taken up for GC-MS analysis..

### GC - MS Analysis of *Patru chooranam*

The *Patru chooranam* was subjected to GC-MS analysis as per standard procedure. The metabolites in the samples were identified using a P2010 gas

chromatography with thermal desorption system TD20 coupled with mass spectroscopy (Shimadzu). The ionization voltage 70ev and GC was conducted in the temperature programming mode with a Restek column (0.25mm, 60m, XTI-5). The temperature in the initial column was 800c for 1 min, and then increased linearly to 700c to 2200c held for 3 min followed by linear increased temperature 1000 c up to 2900c and held for 10min. The injection port temperature was 2900 c and the GC/MS interface was maintained at 290c, the samples were introduced via an all glass injector working in the split mode with helium carrier gas low rate with 1.2 ml per minute. The identification of metabolites was accomplished by comparison of retention time and fragmentation pattern with mass spectra in the NIST spectral library stored in the computer software ( version 1.10 beta, Shimadzu ) of the GC-MS. The relative percentage of each extract constituent was expressed with peak area normalization.

## Results and Discussion

From the GC MS analysis a number of compounds were identified of which the following were present in high quantities and a few were in minute quantities (Figure 1 and Table 1). Among the major molecules the important ones which show biological and medicinal activities are described.

Figure-1: GC MS graph of Pattru Chooranam.

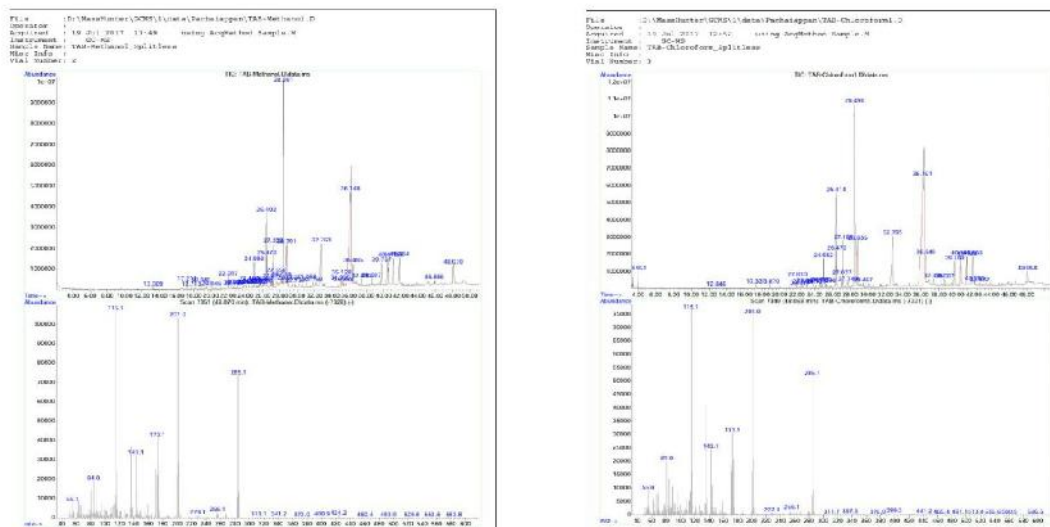


Table -1; Indicating retention time, Name, Molecular structure, Molecular weight and % peak values of various bio molecules found in GC MS analysis

SINO	Retention Time (Min)	Name of Compound	Mol. Structure	Mol. Weight	Peak value
1.	12.846	Camperol	$C_{10}H_{16}O$	152	109
2.	17.331	Thymol	$C_{10}H_{14}O$	150	135
3.	18.870	Eyginol	$C_{10}H_{12}O_2$	164	169
4.	24.131	Alpha zingiberine	$C_{15}H_{24}$	204	105
5.	24.131	Lauric acid	$C_{12}H_{24}O_2$	200	85
6.	24.575	Curcumine	$C_{15}H_{24}$	204	119
7.	26.414	Tumerone	$C_{15}H_{22}O$	218	201
8.	31.952	Tolune	$C_7H_8$	92	91
9.	38.687	Gingerol	$C_{17}H_{28}O_4$	294	137
10.	39.788	Abetic acid	$C_{20}H_{30}O_2$	302	259
11.	42.622	Phthalate	$C_{24}H_{38}O_4$	390	167
12.	48.070	Piperine	$C_{17}H_{19}NO_3$	285	201
13.	27.077	Germacrone	$C_{15}H_{22}O$	218	136
14.	25.595	Spathulenol	$C_{15}H_{24}O$	220	105

**1. Camperol:** This compound is known for its antibacterial activity<sup>[9]</sup>.

**2. Thymol:** Thymol is reported to have hair growth potential<sup>[10]</sup>. Thymol derivatives have antioxidant, antibacterial and anti-inflammatory activities.<sup>[11,12,13]</sup>

**3. Eugenol:** Synthetic Eugenol has been reported to have many important medicinal properties as is described by many reporters. It is an antifungal agent particularly against *Candida albicans*<sup>[14]</sup>. Eugenol is a powerful fat soluble antioxidant and maintains the activities of the body antioxidant enzymes.<sup>[15]</sup> Pharmacologically eugenol has been reported as anticonvulsant and local anaesthetic, anti-stress and bacteriostatic and bactericidal<sup>[16]</sup>. have demonstrated the effect of eugenol on the geno toxicity of established mutagens in liver.<sup>[17]</sup> Anti carcinogenic potential of Eugenol was reported<sup>[18]</sup>. It depresses activity of central nervous and neuromuscular function

<sup>[19]</sup>. It also prevents radiation induced chemical oxidative damage in cell membranes and modifies the membrane associated signalling process after radiation exposure<sup>[20]</sup>. It possesses antiviral activity in vitro and in vivo against human herpes virus<sup>[21]</sup>. Eugenol was found to induce apoptosis in melanoma cells and HL-60 leukemia cells<sup>[22,23]</sup>. Moreover, it has been reported that dimers of eugenol related compounds have a better antioxidant activity than the original monomers<sup>[24]</sup>.

**4. Zingiberine;** well as its antioxidant, anti-inflammatory and antinociceptive potential<sup>[25]</sup>.

**5. Lauric acid:** It is transported directly to the liver where it is directly converted to energy and other metabolites rather than being stored as fat<sup>[26]</sup>. Lauric acid on inhibiting urinary tract infection, respiratory tract infection and digestive tract infection.

**7. Tumerone:** Tumerone acts as antivenom, anticancer and as antioxidant<sup>[27]</sup>.

**6. Curcumin** has been found to possess anti-cancer activities via its effect on a variety of biological pathways involved in mutagenesis, oncogene expression, cell cycle regulation, apoptosis, tumorigenesis and metastasis. Curcumin has shown anti-proliferative effect in multiple cancers, and is an inhibitor of the transcription factor NF- B and downstream gene products<sup>[28]</sup>.

**8. Tolune:** Tolune is reported to be Antitumor<sup>[29]</sup>

**10. Abietic acid:** Abietic Acid is a potent testosterone 5 $\alpha$ -reductase inhibitor, a cancer inhibitor, antioxidant, antibacterial and antiacetylcholinesterase<sup>[30, 31,32]</sup>.

**11. Phthalate:** This is reported to be antiulcer, antimicrobial, anxiolytic, antiviral, antitumor and cytotoxic activities<sup>[33]</sup>

**12. Piperine:** Piperine has diverse biological and supportive therapeutic activities like radioprotective, immunomodulatory and anti tumor activities, antidepressant, anticonvulsant, antinociceptive, and anti-arthritis<sup>[34]</sup>. It helps in the absorption of selenium, vitamin B and Beta carotene as well as other nutrients. Among the various properties of piperine, the most important is that it facilitates the bioavailability of medicines by depressing the activity of drug metabolizing enzymes<sup>[35]</sup>. Dendrite elongation inhibition activity was reported<sup>[36]</sup>.

## Conclusion

Presence of Eugenol, Tumerone, Piperine, Abietic Acid, Curcumine, Phthalate, Spathulenole, Gingerol in Patru chooranam was analysed. These compounds have anti-inflammatory, antioxidant, local anaesthetic, antiviral and antibacterial activities. The GC-MS analysis results and literature evidences of various pharmacological actions revealed Patru chooranam is effective to treat sinusitis as an external application.


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