



GC MS analysis of one ayurvedic polyherbal formulation “Patoladi kwatha churnam” for psoriasis

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Abstract

This study explains with the GC MS analysis of one Ayurvedic polyherbal formulation, Patoladi Kwatha Churna used the treatment of psoriatic disease. The prepared formulation of "Patoladi Kwatha Churnam" was extracted with ethanol and analyzed by GC- MS identification of different compounds. Some important molecules such as bicyclo [2.2.2] oct-2-, 1,2,3,6-tetramethyl, benzene heptanoic acid, 4,5-dioxo-, 4-Bromo-butyl ester, tricyclo [3.3.1.1(3,7)] decane-2,6-dione, 4-hydroxy-, octan-2-one, 3,6-dimethyl-, 10-methyl-e-11-Tridec-1-of acetate, cyclohexane, 4,4-dimethyl-, 5-cyclooctene-1,2-diol, diacetate, 1-adamantane methylamine, alpha,-methyl-, 1-benzyl-4-nitroimidazole, Sclareoloxide(cis-b/c), 1-cyclohexene, 1-cyano-4-isopropenyl-, 2,3-Epoxyhexanol, etc. these molecules indicate the medicinal roles which are similar to the medicinal roles attributed to the "Patoladi Kwatha Churnam" in an Ayurvedic formulation.

Keywords: GC MS- an ayurveda, bicyclo [2.2.2] oct-2-ene, 1,2,3,6 - tetramethyl-, tricyclo [3.3.1.1 (3, 7)] decane-2,6-dione, 4-hydroxy-, 10-methyl-e-11-tridec-1-ol acetate, cyclohexane, 4,4-dimethyl-

Introduction

Patoladikwathachurnam is an Ayurvedic polyherbal formulation, mainly used for chronic skin diseases, especially psoriasis disease. And also used as an *Arocaka* (Ayurvedic term), *anorexia*- (absence of Appetite), *Chardi* (vomiting), *Jwara* (fever), *Kamala*(jaundice), *Kustha* (skin disease), *Visha* (poisoning), *Kaphapitta*-(the principle of structure and metabolism), *Kandu* (itching), *Daha* (burning), The reference of this uses found in the Ayurvedic Formulary of India, Part-I, second edition, page no.57, and Sarnagadhara-Samhita, Prathama Khanda (First Section), page no.59. This Ayurvedic medicine, prescribing at a dosage of 48 grams, Pippali Churna-(Patoladi Kwatha Churna); honey two times a day. In decoction 40 ml two times a day to be taken after food for 21 days duration under the supervision of a qualified Ayurvedic physician. This Patoladi Kwatha Churnam, containing the following ingredients.

Patoladikwathachurnam ingredients ²

1. Patola – *Trichosanthes dioica Roxb.* – Leaves – I part
2. Katurohini (katuka) – *Picrorhiza kurroa Royle ex Benth* – Rhizome – I part
3. Candana (sveta candana) – *Santalum album Linn* – Heart wood – I part
4. Madhusrava (Moorva) – *Marsdeniataenacissima Wight and Arn* – Root - I part
5. Guduci – *Tinosporacordifolia (Willd) Miers* – stem – I part
6. Patha – *Cissampelos pareira Linn* – Root – I part

The medicinal uses of each of the ingredients were reporting by an Ayurvedic Pharmacopoeia of India, part-I. Vol-I and II, and various book and journal references, are mentioned below.

Patola– *Trichosanthes dioica Roxb.* ^{2, 3, 4, 5, 6, 7, 8, 9, 10}

Patola has highly effective in skin diseases, mainly used for Bacterial skin infection, fungal infection, wound healing, purgative, leprosy, jaundice, fever, diabetes, cancer, antioxidant, and blood purifier.

Katurohini (katuka) – *Picrorhizakurroa Royle ex Benth* ^{2, 3, 4, 5, 6, 7, 8, 9, 10}

Katurohini used an Ayurvedic medicine treatment of Wound Healing, Digestive Problems, Asthma, Liver damage, Hepatoprotective, Anti-cholestatic, Antioxidant, and Immunomodulating activity.

Candana (sveta candana)– *Santalum album Linn* ^{2, 3, 4, 5, 6, 7, 8, 9, 10}

Sandalwood oil has been using in folk medical treatment of skin diseases, common colds, bronchitis, skin disorders, heart ailments, general weakness, fever, infection of the UTI, inflammation of the liver, and gall bladder.

Madhusrava (moorva)– *Marsdeniataenacissima Wight and Arn* ^{2, 3, 4, 5, 6, 7, 8, 9, 10}

In Ayurveda, *Marsdeniataenacissima Wight and Arn.* have been used in the treatment of various diseases such as Fungal infection of the skin, Leprosy, Fever, Itching, Obesity, Urinary disorder, Intestinal parasites, Piles, Excessive thirst, Purgative, Ulcerative colic, and Gonorrhoea.

Tinospora cordifolia (Willd) Miers ^{2, 3, 4, 5, 6, 7, 8, 9, 10}

In Ayurvedic medicine, *Tinosporacordifolia (Willd) Miers.* It has been using in skin disease, Leprosy, Snakebite, Malaria, Dysentery, Jaundice, and Cough.

***Cissampelos pareira* Linn** 2, 3, 4, 5, 6, 7, 8, 9, 10

In Indian Ayurvedic medicine, that used for the treatment of skin diseases, Itching, Leucoderma, Leprosy, Common colds, Cough, Diarrhea, Stomach disease, Fever, Dog Bite, Scorpion bite, Dysentery, Piles.

Materials and Methods 1, 2, 3, 4

Patoladikwathachurna is a polyherbal formulation used in an Ayurvedic system of medicine. An ethnomedical survey among Ayurvedic physicians revealed the formulation prescribed for skin disease activity. As per API, it has been observing could be given to treat skin diseases. All the plants were collecting from various parts of the Indian states. Three plants authenticated by Central Siddha Research Institute, Govt. Of India, Arumbakkam, Chennai. The remaining three plants, Authenticated by the Regional Ayurveda Drug Development Institute, Ministry of Ayush, Govt. of India, Arumbakkam, Chennai, and the GC MS, were analyzed by the standard procedure.

Instrument

GC-MS Analysis Report Information

Make: Perkin Elmer

GC Model: Clarus 680

Mass Spectrometer: Clarus 600 (EI)

Software: Turbo Mass Year 5.4.2

Library Year: NIST-2008

Inst() ACQUISITION PARAMETERS

Oven: Initial Temp 60o C for 2 min,

Ramp 10o C/min to 300o C, Hold 6 Min,

Total Run Time: 32, 00 Mint

Inj. An Auto 260o C, Volume 1 µL,

Split 10:1,

Flow Rate: 1MI/Mint

Carrier Gas He, Column Elite 5MS (30.0M, 0.25MM ID, 250µm df)

MASS CONDITION (EI)

Solvent Delay 2.00 Min,

Transfer Temp 240o C,

Source Temp 240o C,

Scan: 50 to 600 DA,

GC-MS analysis

The Clarus 680 GC-MS has been using in an analysis applied in a fused silica column and packed with Elite-5MS (5% biphenyl 95% dimethyl polysiloxane, 30 m × 0.25 mm ID × 250µm df). Compounds were separating by using Helium as carrier gas at a constant flow of 1 ml/min. Injector temperature set as 260 °C during the chromatographic running. 1µL of the sample extract injected into the GC-MS instrument oven temperature was as follows: 60 °C (2 min); followed by 300 °C at the rate of 10 °C minimum-1; and 300 °C, where it held for 6 minutes. The mass detector conditions are: transfer line temperature is 240 °C; ion source temperature 240 °C; and ionization mode electron impact at 70 eV, a scan time 0.2 sec and scan interval 0.1 seconds and the fragments from 40 to 600 Da. The GC-MS spectrum of compounds comparing with the database of the spectrum of known compounds stored in the GC-MS NIST (2008) library.

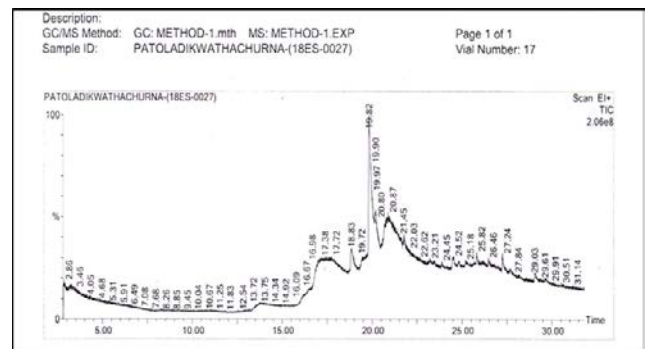
Results and Discussion

Fig 1: GC MS Graph of Patoladi Kwatha Churnam

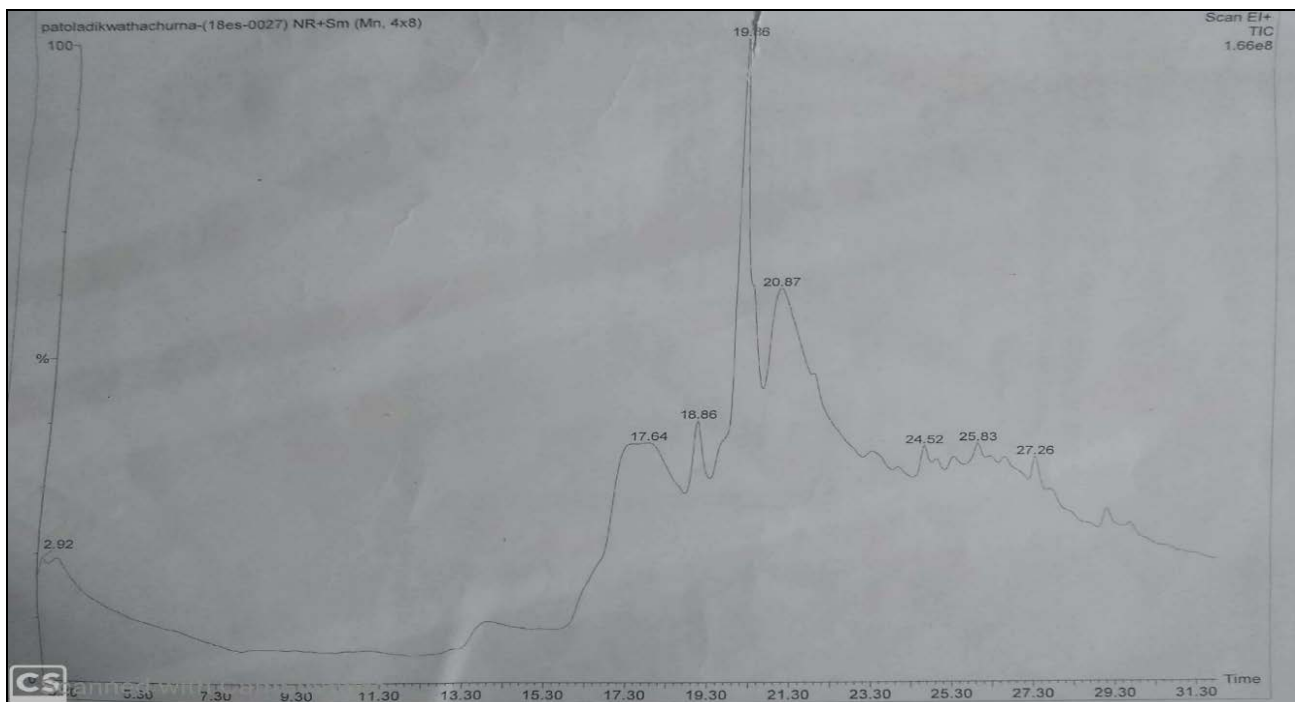


Fig 2: GC MS Outline Graph of Patoladi Kwatha Churna

The GC MS profile of Patoladi Kwatha Churna is showing in fig. I. The medicinal role of the important present compounds are tabulated and collected from various sources like the ethnobotanical database, NIST Chemical Library, and literature survey is mentioned and shown in table-1. The total number of 12 most abundant compounds with their retention time, molecular formula, molecular weight, peak area, area percentage, height, and compound structure shows in table-1. GC-MS chromatogram of the 12 peaks of the compounds detected and shown in fig. 1, 2. The compounds found in the ethanolic extract of ayurvedic formulation Patoladi Kwatha Churna were Bicyclo [2.2.2] oct-2-ene, 1, 2, 3, 6-Tetramethyl [100.00%], Benzeneheptanoic acid, 4, 5-dioxo-, 4-Bromobutyl ester [28.95%], Tricyclo [3.3.1.1(3, 7)] decane-2, 6-dione, 4-Hydroxy- [76.99%], Octan-2-one, 3, 6-Dimethyl- [26.92], 10-Methyl-e-11-Tridece-1-of acetate [99.44%], Cyclohexane, 4, 4-Dimethyl- [57.24%], 5-Cyclooctene-1, 2-diol, diacetate [20.25%], 1-Adamantanemethylamine, alpha,-methyl-[9.04%], 1-Benzyl-4-nitroimidazole [6.01%], Sclareoloxide [8.91%], 1-Cyclohexene, 1-cyano-4-isopropenyl- [10.28%], 2, 3-Epoxyhexanol [7.43%] were obtained. Based on the results, the above 12 bioactive compounds were identified from the Patoladi Kwatha Churna by GC-MS, many of them showing potential therapeutic activity against various diseases is as follows 1-Adamantanemethylamine, alpha,-methyl-used as an antiviral drug against various strains of Flu and then to treatment for Parkinson's disease against herpes, hepatitis, HIV treated acne.

1-benzyl-4-nitro-imidazole is an antibiotic used to treat parasitic infections, skin infections, meningitis, lower respiratory infections, bacterial infections, bacterial vaginosis, gastrointestinal infections, meningitis, lower respiratory infections, diarrhea, and Rosaceae. They work by killing the bacteria.

Sclareoloxide is an amber-colored solid has contained a balsamic scent, and Sclareol kills the human leukemic cells and colon cancer cells by apoptosis.

2, 3 Epoxyhexane obtained from Sharpless Asymmetric Epoxidation is regioselectively reducing into 1, 3-Hexanediol. It has converted into 3-benzyloxy hexyl acetates. It has been mainly using for chemical reagents, organic intermediates, fine chemicals, pharmaceutical research, and development.

Heptanoic acid is a c 7 short-chain fatty acid that contributes to the odor of rancid oils is used for the preparation of esters and used for fragrance industries as an additive in cigarettes. It is a medium-chain fatty acid and straight-chain saturated fatty acid.

Phenolic compounds esters, alkanes, aldehydes, alkenes, and ketones are having major volatile compounds. Containing anti-bacterial, Anti-inflammatory, Anti-Arthritic, Antidiabetic, Antiulcer, Hypolipidemic, Anti-atherosclerotic, Anti-HIV, and Cytotoxic activities. (Safayhi & Sailer, 1997), (Costantino *et al.* 1993) [30, 31] 14 other alkenes having anti-fungal activity against fungal spores germination, antioxidants, and antitumors (Dandekar *et al.* 2015) [32] 14.

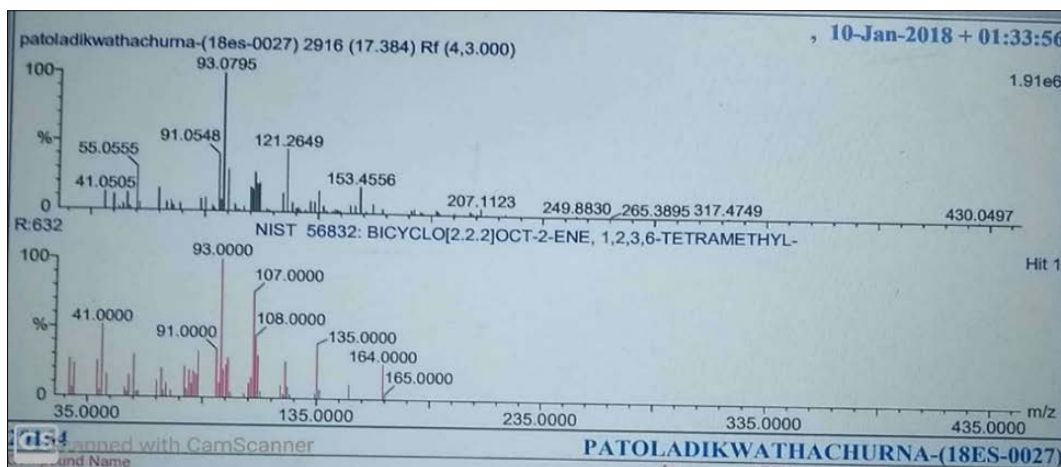


Fig 3: GC MS Peak of Patoladi Kwatha Churnam comparing with the higher percentage (100%) compound.

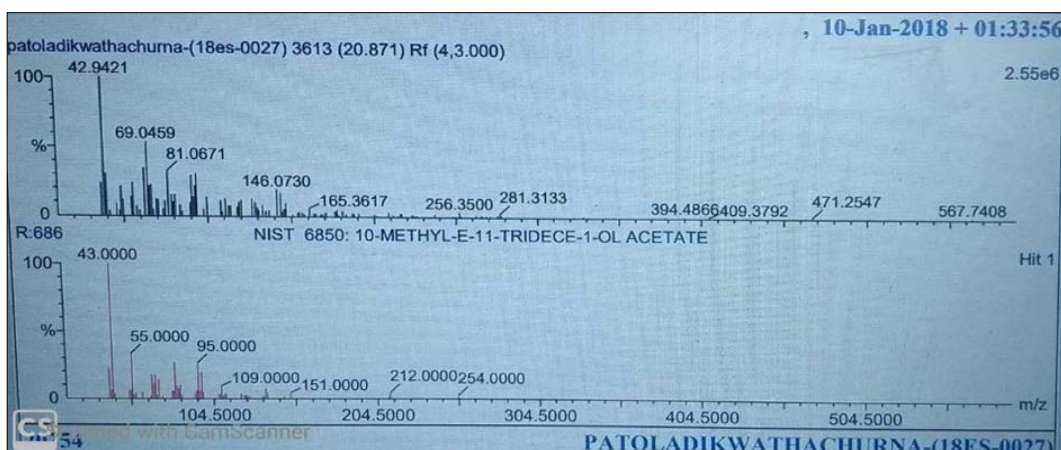


Fig 4: GC MS Peak of Patoladi Kwatha Churnam compared with the higher percentage (99%) compound

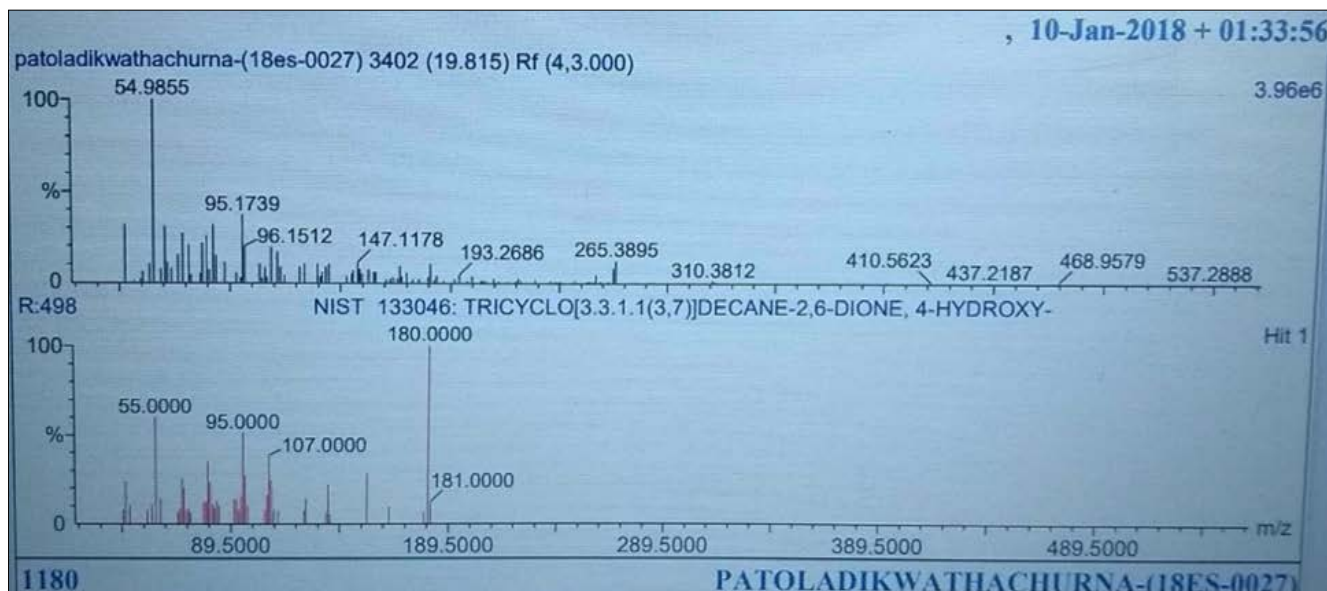


Fig 5: GC MS Peak of Patoladi Kwatha Churnam compared with the higher percentage (77%) compound



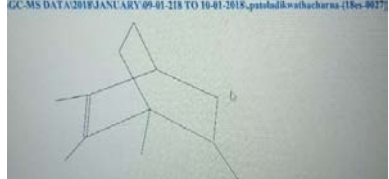
Fig 6: GC MS Peak of Patoladi Kwatha Churnam compared with the higher percentage (57%) of the compound

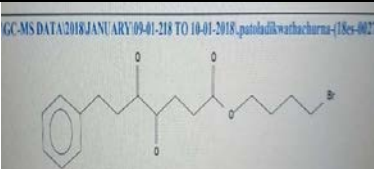

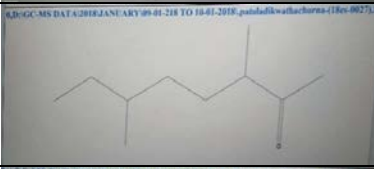

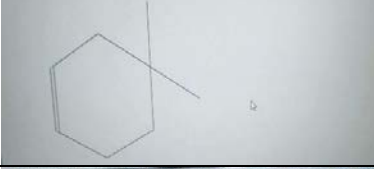
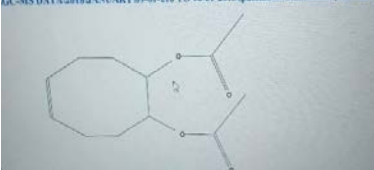
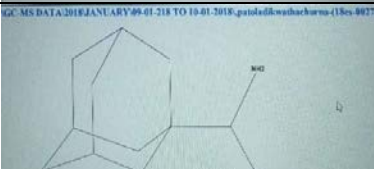
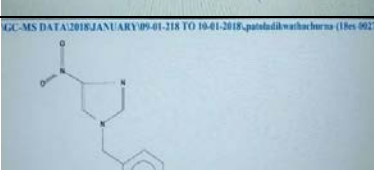
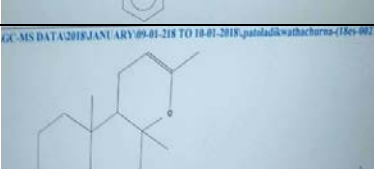
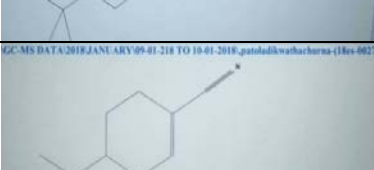
The above four main compounds chromatogram mentioned in (Figure-3, 4, 5, 6) and compared with the Patoladi Kwatha Churnam such as bicyclo [2.2.2] oct-2-en, 1, 2, 3, 6- Tetra-methyl [100%], Methyl-e-11-tri-1-of acetate [99.44%], tricyclo [3.3.1.1(3, 7)] decane-2,6- dione, 4-hydroxy- [76.99%], cyclohexane, 4, 4-dimethyl- [57.24%], these four higher percentage biomolecule having higher

volatile compounds such as Alkenes, Ketones, Alkanes, Esters, and aldehyde.

It has been active against anti-fungal activity and active against fungal spores germination and has antioxidant and antitumor (Dandekar *et al.* 2015) [32] 14, and anti-bacterial activity. (Safayhi & Sailer, 1997), (Costantino *et al.*, 1993) [30, 31] 14.

Table 1: GC-MS data of Patoladi Kwatha Churnam has shown in Table 1

S.No	Compound Name	RT	Peak Area	Area %	Height	Mol. Formula	Mol. Weight	Compound structure
1	Bicyclo [2.2.2] oct 2-en, 1,2,3,6 tetramethyl	17.38	72919376	21.38	43771096	C ₁₂ H ₂₀	164	

2	Benzene heptanoic acid, 4,5 dioxo-, 4 Bromo butyl ester	18.84	21107116	6.19	48223408	C ₁₇ H ₂₁ O ₄ Br	368	
3	Tricyclo [3.3.1.1(3,7)] decan 2, 6-dione, 4 hydroxy	19.82	56142324	16.46	179185536	C ₁₀ H ₁₂ O ₃	180	
4	Octan-2-one, 3,6-dimethyl	20.190	19632098	5.75	82659736	C ₁₀ H ₂₀ O	156	
5	10 methyl-e-11-trice dece 1-ole acetate	20.87	72508120	21.25	77168344	C ₁₆ H ₃₀ O ₂	254	
6	Cyclohexene, 4,4-dimethyl	21.76	41736080	12.23	53774028	C ₈ H ₁₄	110	
7	5 cyclo octene 1,2 di ole, diacetate	23.19	14765911	4.32	25044520	C ₁₂ H ₁₈ O ₄	226	
8	1-adamantane methylamine, alpha. -methyl-	24.54	6594532	1.93	24059220	C ₁₂ H ₂₁ N	179	
9	1-benzyl-4-nitroimidazole	24.83	4380001	1.28	18198248	C ₁₀ H ₉ O ₂ N ₃	203	
10	Sclareoloxide	25.19	6499999	1.90	18039912	C ₁₈ H ₃₀ O	262	
11	1 cyclohexene, 1, cyano 4-isopropenyl	25.81	7496185	2.20	23873470	C ₁₀ H ₁₃ N	147	

12	2,3-Epoxyexanol	26.46	5415275	1.59	1587111 5	C ₆ H ₁₂ O ₂	116	
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Conclusion

The above GC-MS report describes that the Patoladikwathachurna containing the various role of some main biomolecules, which indicate the medicinal properties of this formulation, and its overall efficacy in curing Skin Diseases, especially for "Psoriatic Disease."

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I honestly thank Dr. Ilango, Professor and Head of Thamizh University, Thanjavur, and Dr. Prakashyoganantham, Assistant professor, Mother Theresa Postgraduate and Research Institute of Health Sciences, Puducherry, for timely helping to do my project work.

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