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Research Article

The GC MS Study Of Ayurvedic Upanaha Drug Kinva Choorna Used In Knee Osteoarthritis

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ABSTRACT

Background: The scientific validity of contemporary and alternative medicinal practices is need of hour and significant importance in today's context.
Aim and Objective: In present study gas chromatography-mass spectrometry (GC-MS) analysis to investigate a kinva choorna of amrutarishta, aiming to establish correlations between its therapeutic activity and the biomolecules it contains.
Materials and Methods: Procured sample from GMP Certified KLE Ayurveda Pharmacy, it is shade dried and powdered in pulveriser then packed into air tight packets after sieving by sieve no 8 and authenticated at KAHER's Shri B M K Ayurveda Mahavidyalaya's AYUSH Approved ASU Drug Testing Laboratory (LIC.No.TL-8/2011). underwent GC-MS analysis using standard procedures.
Results and Discussion: The result profile revealed the presence of crucial molecules like, 12,15-Octadecadiynoic acid Z-1,9-Hexadecadiene(9Z)- n-Hexadecanoic acid, Decanoic acid, decyl ester, 2-Pentadecyn-1-ol, Decyl decanoate and 9,12-octadecadienoyl chloride (Z, Z), aligning with the medicinal properties attributed to kinva choorna. Conclusion: The identification of these biomolecules supports the role of kinva an effective pain-relieving drug used for upanaha (Poultice) drug in knee osteoarthritis.

KEYWORDS: Upanaha, Knee Osteoarthritis, 12,15-Octadecadiynoic acid, Z-1,9-Hexadecadiene(9Z) acid ayurvedic; Amrutarishta Kinva choorna ; dodecanoic acid; GC-MS; decyl decanoate

INTRODUCTION:

Gas chromatography - Mass spectrometry is a technique ideal for metabolomic profiling of vaporized single or a blend of various plant samples [1]. According to Gomathi et al., 2015 [2], "Bioactive molecules" are compounds that occur in nature, part of the food chain, capable of interacting with one or more compounds of living tissue, exerting a synergistic effect on human health. The most commonly used separation techniques for bioactive compounds are thin layer chromatography (TLC), column chromatography (GCMS, LCMS) flash chromatography and HPLC, should be used to obtain pure compounds. The pure compounds are then used for the determination of structure and biological activity. Asava-Arishta, Sura, Varuni, Sidhu preparations are categorized under 'Madya' group and Sauviraka, Tushodaka, Kanjika, Dhanyamla under Shuktha group. The residue obtained after the filtration of the final product of the fermentation called surabeeja or kinva is dried and stored for further use [3], as it is mentioned one of upanaha Dravya mentioned for knee osteoarthritis [4], it is observed that all Ayurveda pharmacies discard kinva after the sandhana preparations so, the present investigation has helped to identify ten bioactive chemical constituents in kinva of amrutarishta by using GC-MS technique. Furthermore, these screened potential bioactive compounds can be effectively used for biomedical and therapeutic applications.

MATERIALS AND METHOD:

Sample Collection

Kinva of Amrutarishta was collected from GMP Certified KLE Ayurveda Pharmacy. Teaching Pharmacy of KAHER's Shri B. M.Kankanwadi Ayurveda Mahavidhyalaya, Belagavi, it is shade dried and powdered in pulverizer then packed into air tight packets after sieving by sieve no 8 and authentication was done at KAHER's Shri B M K Ayurveda Mahavidyalaya's AYUSH Approved ASU Drug Testing Laboratory (LIC.No.TL-8/2011).

Instrument

Gas chromatography (Agilent: GC: (G3440A) 7890A. MS MS: 7000 Triple Quad GCMS,) was equipped with Mass spectrometry detector

Sample Preparation

1gm sample Dissolved in 10ml of Acetone. The solution stirred vigorously using vortex stirrer for 10 seconds. The 1µL clear extract was determined using gas chromatography for analysis. The compounds are identified by GC-MS Library (NIST & WILEY).

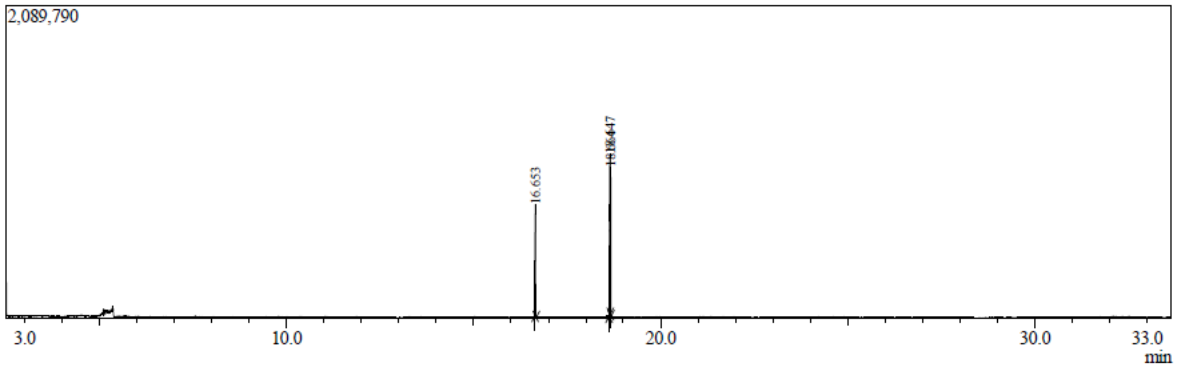
Table 01: Column Oven Temperature Program

	Rate	Value	Hold Time (Min)
Initial Temperature	-	80.0° C	2
Boost	10.00	280.0° C	10
Boost	20.00	330.0° C	5

RESULTS:

The Obtained Peaks are presented with their compounds in Table 2

Sl.no	Retention Time	Peak Compound Name	Molecular weight (g/mol)	Formula	Area%
1	16.655	Decanoic acid, decyl ester. Decyl decanoate	312	$C_{20}H_{40}O_2$	23.50
2	16.650	Ether, 6-methylheptyl vinyl Heptane,	156	$C_{10}H_{20}O$	23.50
3	16.660	Tetradecane, 1-fluoro-Tetradecyl fluoride	216.38	$C_{14}H_{29}F$	23.50
4	18.645	2-Pentadecyn-1-ol	224	$C_{15}H_{28}O$	56.34
5	18.648	9-Octadecenal, Octadecenyl aldehyde, (9E)-9-Octadecenal	266	$C_{18}H_{34}O$	56.34
6	18.649	12,15-Octadecadiynoic acid, Octadeca-9,12-dienal	264	$C_{18}H_{32}O$	56.34
7	18.650	Z-1,9-Hexadecadiene(9Z)- n-Hexadecanoic acid	222	$C_{16}H_{30}$	56.34
8	18.665	1-Dodecyne	166	$C_{12}H_{22}$	56.34
9	18.679	10-Undecenal, Undecylenic aldehyde,	168	$C_{11}H_{20}O$	20.16
10	18.670	9-Decenal, Dec-9-enal	154.25	$C_{10}H_{18}O$	20.16



Peak Report TIC

Peak#	R.Time	I.Time	F.Time	Area	Area%	Height	Height%	CAS#	Name
1	16.653	16.640	16.675	542046	23.50	746830	26.66	1654-86-0	Decanoic acid, decyl ester
2	18.647	18.620	18.655	1299520	56.34	1072210	38.27	2834-00-6	2-Pentadecyn-1-ol
3	18.664	18.655	18.675	464963	20.16	982321	35.07	5090-41-5	9-Octadecenal
				2306529	100.00	2801361	100.00		

Figure 01: Chromatogram of Kinva Choorna

DISCUSSION:

Osteoarthritis (OA) is the most common rheumatic disease and 4th most common cause of disability and about 10–15% of all adults aged over 60 have some degree of OA worldwide. The disease commonly affects the knee but can also affect the hips, hand, shoulder, and spine. OA especially of hip and knee causes significant locomotor disability[5]. Upanaha, application of medicated poultice is one among four major categories of swedana therapies, which relieves pain, restricted movement, and stiffness [6]. Kinva is a residual portion which remains after completion of sandanakalpana (acidic and alcoholic fermented formulations), and it is one of dravya explained for upanaha[4].

However, neither scientific investigation has been conducted to confirm its ability to manage Knee osteoarthritis, nor the phytochemical compounds have been identified. Therefore, in the present study, we confirmed the capability of Kinva choorna on Knee osteoarthrirtis, and the fractions facilitated the identification of important chemical components contributing to the therapeutic effect. The GC-MS is widely recognized as the “gold standard” in forensic material identification due to its ability to perform targeted analysis of a given sample,[7] [8] the analysis showed the presence of fourteen compounds in the kinva choorna of amrutarishta by comparing their retention times and by interpretation of their mass spectra. The compounds identified and their retention time, molecular formula, and concentration (peak area%) are presented in Table-2. The results pertaining to GC-MS analysis of the phytocomponents showed three peaks - Fig -1. This has implications for the development of integrative healthcare approaches that combine the strengths of traditional medicine with evidence-based practices. The presence of some important molecules such as 12,15-Octadecadiynoic acid Z-1,9-Hexadecadiene(9Z)- n-Hexadecanoic acid, Decanoic acid, decyl ester, 2-Pentadecyn-1-ol,Decyl decanoate have similar properties such as anti-inflammatory [9] [10]., acidifier, acidulant, arachidonic acid inhibitor, increase aromatic amino acid decarboxylase activity, and the above properties are acclaim to be its medicinal uses. The inhibition of arachidonic acid renders the inactivation of Cox 1 and Cox 2 enzymes, thus stopping the synthesis of prostaglandins. Thus, these molecules present in kniva choorna function as non-steroidal anti-inflammatory drugs (NSAIDs), thus reducing pain. The molecules 9,12-octadecadienoyl chloride (Z, Z) has properties such as increased zinc bioavailability and zinc provider. An increase in aromatic amino acid decarboxylase activity leads to an increase in the production of catechol amines, which causes mood elevation, stress relief, and increased blood circulation in the affected areas due to inflammation or arthritis easing, the pain and inflammation. It is interesting to find that this choorna is consisting of many plants, but only a few molecules are observed in the GC-MS, and their mechanism of action is almost similar. The use of so many ingredients is enigmatic and further probe into the mechanism of action is warranted.

CONCLUSION:

The above results and discussion clearly indicate the role of kinva as a upanaha medicine which helps in the treatment of Knee osteoarthritis.

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