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Research Article

Comparative GC-MS Analysis of In-House Prepared and Commercial Market Sample of *Avartita Guduchi Taila*

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ABSTRACT

Background: *Sneha Kalpana* (oil formulation), particularly *Avartita Guduchi Taila*, enhances *Guduchi's* (*Tinospora cordifolia* [Willd.] Miers) therapeutic potency through repeated processing. Comparative phytochemical profiling of classically prepared, hundred-times-processed Shatapaka Guduchi Taila (SGT) and the same-time-processed Market Guduchi Taila (MGT) remains unexplored despite their processing similarities. **Materials and Methods:** Hundred-cycle *Avartita* SGT was prepared using *Guduchi* (*kalka*), *Tila Taila* (*sneha*), and *Goksheera* (*drava*) as per Ayurvedic Pharmacopoeia standards at a GMP-certified facility. Market-equivalent MGT was procured from a licensed GMP-certified Ayurveda pharmacy (confidentiality maintained). Samples were analysed by GC-MS (DB-5MS column, helium carrier, NIST library ≥85% match). Peaks were normalised to TIC area % for semi-quantitative comparison by retention time alignment. **Results:** SGT exhibited cholesterol dominance (49.06%, RT 34.292 min) with 12 major peaks. MGT showed diosgenin predominance (12.839%, RT 50.677 min) across 36 peaks. SGT is enriched in antioxidant squalene/phytosterols, while MGT is dominated by steroidal sapogenins (diosgenin, gitogenin). Common fatty acids confirmed processing identity. **Conclusion:** Distinct phytochemical profiles despite identical Shatapaka processing underscore raw material variability and thermal transformation effects. SGT favors sustained Rasayana/antioxidant action while MGT excels in acute anti-inflammatory/immunomodulation. Findings advocate for processing standardization for consistent Ayurvedic lipid formulations.

Keywords: *Avartana*, GC-MS Profiling, Phytochemical Comparison, *Shatapaka Guduchi Taila*.

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INTRODUCTION

Sneha Kalpana (unctuous formulations) constitutes one of the most important pharmaceutical dosage forms in Ayurveda, widely employed for both internal and external administration owing to its superior bioavailability, stability, and ability to facilitate deeper tissue penetration of active principles. Among the various medicated oils described in classical texts, Guduchi Taila occupies a unique position due to its elaborate multiple time processing technique (*Avartana*) involving repeated processing of *Guduchi* (*Tinospora cordifolia* [Willd.] Miers) with *sneha* (Sesame Oil) and *drava dravyas* (Cow Milk) which is said to enhance the therapeutic potency, *Rasayana* (rejuvenating) potentials, and *sukshma anuvahana* (deep nourishing) capacity of the formulation, particularly in *Vata*-dominant and inflammatory disorders.

Tinospora cordifolia [Willd.] Miers is a widely studied medicinal plant with well-established anti-inflammatory, immunomodulatory, antioxidant, antidiabetic, anticancer and adaptogenic properties. Phytochemical investigations have demonstrated the presence of diverse bioactive compounds, including alkaloids (e.g., magnoflorine, palmatine), diterpenoid lactones (e.g., tinosporide, columbin), glycosides (cordifoliosides), steroids, terpenoids, and fatty acid derivatives, which collectively contribute to its broad pharmacological activity (Ghosh & Saha, 2012; Sharma *et al.*, 2019). These constituents have been shown to modulate inflammatory pathways, oxidative stress, and immune responses, supporting the traditional therapeutic claims of Guduchi (Upadhyay *et al.*, 2010). Incorporation of herbal drugs into lipid media facilitates extraction and stabilisation of lipophilic and semi-polar constituents, thereby improving absorption and therapeutic efficacy, a concept well supported by

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modern lipid-based drug delivery research (Sharma & Shetty, 2024; Pouton, 2000).

Avartana involves repeated processing and interaction between herbal components and lipid media, leading to chemical transformations and the formation of altered lipid-phytochemical conjugates (Mukherjee *et al*., 2017). In contrast, market-available *Avartita Guduci Taila* formulations, produced using standardised industrial protocols, may exhibit differences in phytochemical composition due to controlled processing and raw material variability. GC-MS serves as an effective analytical tool for profiling volatile and semi-volatile bioactive constituents in such lipid-based Ayurvedic formulations (Azmir *et al*., 2013; Pandey *et al*., 2013; M & Narayanan, 2023). However, comparative scientific evaluations between classically prepared *Avartita Guduchi Taila* and a market-available sample remain limited. Being the first of its kind, this study tries to bridge the gap and evaluate the changes in phytochemicals through pharmaceutical processes.

MATERIALS AND METHODS

Preparation of Samples

Guduchi Taila is an oleaginous compound formulation that comprises *Guduchi (Kalka Dravya), Tila Taila (Sneha Dravya)*, and *Goksheera (Drava Dravya)*. Both samples were prepared utilising *Guduchi* (*Tinospora cordifolia* [Willd.] Miers), *Tila Taila* (*Sesamum indicum* L.), and *Goksheera* (Cow Milk), and underwent a hundred times *avartana* process. In-house hundred times *Avartita Guduchi Taila* (named *Shatapaka Guduchi Taila* – SGT hereafter) was prepared at The Indian Medical Practitioner's Co-operative Pharmacy Stores Ltd. (IMPCOPS) Chennai-41, a GMP-certified Ayurveda Pharmacy, as per Ayurveda Pharmacopeia standards. The GC-MS analysis was done at the Centre for Analytical Instrumentation-Kerala (CAI-K), Kerala Forest Research Institute (KFRI) at Peechi, Thrissur District, Kerala. The commercially available hundred-times processed equivalent formulation (named MGT hereafter) was procured from a licensed GMP-certified Ayurvedic Pharmacy along with GC-MS Analysis details. To maintain commercial confidentiality and avoid potential legal implications, the specific manufacturer name, brand, and batch details are not disclosed.

Procedure

GC-MS chromatograms of SGT and MGT were analysed for direct peak-to-peak alignment by Retention Time (RT) and mass spectral profiles. Peaks were normalized to Total Ion Current (TIC) area percentage for semi-quantitative comparison, with compounds identified at ≥85% NIST library match Similarity Index (SI) and Retention Index (RI) deviation <5% from C8–C40 n-alkane standards. Identified phytochemicals were catalogued by RT, relative abundance (%), molecular formula, and major fragment ions. Therapeutic activities were inferred from documented pharmacological properties of major constituents (>2% peak area) using standard phytoconstituent databases.

Ethical Statement

Ethical approval was not required for this study as it involved only the phytochemical analysis of an herbal formulation and did not involve human or animal subjects.

Statistical Analysis

There is no specific subsection for statistical analysis. The study relies on quantitative analysis (area percentage) and Similarity Indices (SI ≥90%) rather than hypothesis testing statistics.

RESULTS

The Total Ion Chromatogram of SGT (Figure 1) shows 12 major peaks between 6.03 and 35.24 min. The most abundant compound is Cholesterol (49.06% area) at RT 34.292 min. Second major compound: 2,6-Bis (3,4-methylenedioxyphenyl)-3, 7-dioxabicyclo (3.3.0) octane (32.69%) at RT 35.246 min. The names of the detected compounds, their retention times, areas, and properties are detailed in Table 1. The Total Ion Chromatogram of MGT (Figure 2) shows 36 major peaks between 22.46 and 53.28 min. The most abundant compound is Diosgenin (12.839% area) at RT 50.677 min. Second major compound: n-Hexadecenoic acid (11.10 %) at RT 52.15 min. The names of the compounds detected, their retention time, area, and properties are detailed in Table 2. Common phytochemicals in SGT and MGT, along with those identified by GC-MS, and

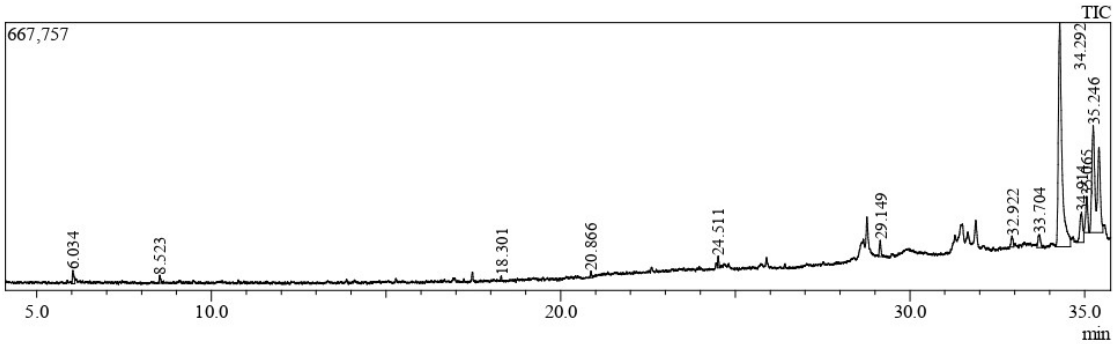

Figure 1: The Chromatogram of GC-MS Analysis of SGT.

Table 1: Details of Compounds detected in GC-MS analysis of SGT with their Retention Time and their Activity.

Sl. No.	Name of the compound	Retention time	Area%	Compound Class	Activity of Compound
1.	Maltol	6.034	1.29	Phenol Derivative	Antioxidant (Song *et al.*, 2015), Anticancer (Han *et al.*, 2023), Anti-Inflammatory (Li *et al.*, 2024), Hepatoprotective (Liu *et al.*, 2018), Cardioprotective (Xing *et al.*, 2022).
2.	2-Decenal, (E)	8.523	0.62	Unsaturated Aldehyde	Antileishmanial (Donega *et al.*, 2014), Anticancer (Vijayakumar *et al.*, 2025).
3.	2H-Pyran-2-one, tetrahydro-6-nonyl-	18.301	0.30	Tetrahydropyranone	Antibacterial, Antiviral, and Anti-Inflammatory (Nazari *et al.*, 2017) Anti-Alzheimer's (Almalki, 2023).
4.	2H-Pyran-2-one, tetrahydro-6-tridecyl	20.866	0.52	Tetrahydropyranone	Anticancer And Antioxidant (Mashrai *et al.*, 2015).
5.	9-Octadecenoic acid (Z)-, oxiranylmethyl ester	24.511	0.86	Fatty Acid Ester	Antioxidant, Anti-Inflammatory, Antimicrobial & Cytotoxic (Sharaf *et al.*, 2022).
6.	Squalene	29.149	1.54	Triterpene Hydrocarbon	Hypocholesterolemic (Hien *et al.*, 2017), Anti-Inflammatory and Anti-Cancer (Abu-Obeid *et al.*, 2022).
7.	(R)-6-Methoxy-2,8-dimethyl-2-((4R,8R)-4,8,12-trimethyltridecyl) chroman	32.922	1.28	Tocopherol/ Chroman Derivative	Anti-Cancerous (Das Gupta & Suh, 2016; Saavedra *et al.*, 2019; Birringer *et al.*, 2003), Antiepileptic (Rawat & Verma, 2016), Antioxidant (Lakkadi *et al.*, 2024), Anti-Inflammatory (Jiang, 2014; Reiter *et al.*, 2007).
8.	Beta-Sitosterol acetate	33.704	1.95	Sitosterol	Anti-Inflammatory, Antioxidant (S. Hidayathulla *et al.*, 2018), Anti-Gastro-ulcer (Xiao *et al.*, 1992), Analgesic (Villaseñor *et al.*, 2002).
9.	Cholesterol	34.292	49.06	Cholestanoids	Immune Regulation, Inflammatory (Hien *et al.*, 2017).
10.	Laurin, 2-capri-1,3-di-	34.292	5.25	Glycerol Ester	Antimicrobial (Matsue *et al.*, 2019), Antioxidant (Ameena M *et al.*, 2024).
11.	3-(Octanoyloxy) propane-1,2-diyl bis(decanoate)	35.065	4.64	Triglycerols	Anti-Inflammatory, Anti-Oxidant (Ratheesh *et al.*, 2022).
12.	2,6-Bis(3,4-methylenedioxyphenyl)-3,7-dioxabicyclo (3.3.0) octane	35.246	32.69	Phenylpropanoid Dimers	Antioxidant (Nakai *et al.*, 2003).

their activities as antioxidants, anti-inflammatory agents, and chemoprotective substances are detailed in Tables 3 and 4.

DISCUSSION

The comparative GC–MS analysis of SGT and the MGT sample demonstrates marked differences in the relative abundance and dominance of key bioactive phytochemicals, which directly influence their anti-inflammatory, antioxidant, immunomodulatory, and chemoprotective activities. Although both formulations underwent *shatapaka avartana* (100 cycles of processing), qualitative and quantitative variations in phytochemical composition were evident, indicating that processing alone does not guarantee identical pharmacological outcomes.

Table 2: Details of Compounds detected in GC-MS analysis of MGT with their Retention Time and their Activity.

Sl. No.	Name of the compound	Retention Time	Area %	Compound Class	Activity of Compound
1.	Diosgenin	50.677	12.839	Steroidal Sapogenin	Anti-inflammatory, Anti-cancerous, Immunological, Anti-thrombotic (Sharma *et al.*, 2019).
2.	n-Hexadecenoic acid	52.150	11.100	Unsaturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
3.	Digin	34.197	10.998	Steroidal Glycoside	Anti-inflammatory, Antiproliferative (Sharma & Shetty, 2024).
4.	Hexadecenoic acid	47.683	6.712	Monounsaturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
5.	cis-13-Octadecenoic acid	37.424	4.332	Monounsaturated Fatty Acid	Anti-inflammatory (Mukherjee *et al.*, 2017).
6.	Docosanoic anhydride	40.011	4.249	Carboxylic Acid Anhydrides	-
7.	Octadecane	50.426	3.561	Alkane	Anti-bacterial, Anti-cancer, Anti-asthmatic (Azmir *et al.*, 2013).
8.	Hexadecenoic acid	39.217	3.027	Unsaturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
9.	Tetradecanoic acid	30.256	2.946	Saturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
10.	Cholesterol	53.286	2.395	Cholestanoids	-
11.	Hexadecenoic acid,	43.623	2.386	Unsaturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
12.	Octadecanoic acid	37.847	2.335	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
13.	Tetradecanoic acid	44.707	2.237	Saturated Fatty Acid	Anti- inflammatory (Upadhyay *et al.*, 2010).
14.	Octadecanoic acid	36.421	1.937	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
15.	4,8,12,16-Octadecatetraen-1-ol, 4,9,13,17tetramethyl-	32.915	1.921	Terpenoid	-
16.	Oleic acid	42.183	1.841	Monounsaturated Fatty Acid	Anti-inflammatory (M & Narayanan, 2023).
17.	Squalene	32.719	1.831	Triterpene Hydrocarbon	Anti-inflammatory, Antioxidant (Lou-Bonafonte *et al.*, 2018).
18.	Octadecane	44.520	1.619	Alkane	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
19.	Octadecanoic acid	36.563	1.521	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).

Sl. No.	Name of the compound	Retention Time	Area %	Compound Class	Activity of Compound
20.	Stearic anhydride	42.608	1.491	Carboxylic Acid Anhydrides	Anti-inflammatory. Hepatoprotective (Aparna *et al.*, 2012).
21.	(22R)-6α,11β,21-Trihydroxy-16α,17αpropylmethylenedioxypregna-1,4-diene3,20-dione	44.004	1.284	Steroid	-
22.	Hexadecenoic acid	33.289	1.265	Monounsaturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
23.	Octadecanoic acid	43.347	1.219	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
24.	Dodecanoic acid	26.260	1.214	Saturated Fatty Acid	Anti-microbial (Pan *et al.*, 2011).
25.	Tetradecanoic acid	35.000	1.046	Saturated Fatty Acid	Anti-inflammatory (Upadhyay *et al.*, 2010).
26.	Ar-turmerone	28.222	0.942	Sesquiterpene	-
27.	Dodecanoic acid	22.463	0.939	Saturated Fatty Acid	Anti-microbial (Carrillo *et al.*, 2012).
28.	Tumerone	20.011	0.905	Sesquiterpene	-
29.	Octadecanoic acid	45.999	0.783	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
30.	Hexadecenoic acid	32.564	0.669	Monounsaturated Fatty Acid	Anti- inflammatory (Upadhyay *et al.*, 2010).
31.	1H-Indene	39.583	0.635	Polycyclic Aromatic Hydrocarbon	-
32.	Decanoic acid	28.522	0.521	Saturated Fatty Acid/ Carboxylic Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
33.	Curlone	28.990	0.462	Sesquiterpene	Antioxidant, Anti-inflammatory, Anti- nociceptive (Carrillo *et al.*, 2012).
34.	Octadecanoic acid	37.047	0.401	Saturated Fatty Acid	Anti-bacterial, Anti-cancer, Anti-asthmatic (Pandey *et al.*, 2013).
35.	Dodecanoic acid	31.762	0.344	Saturated Fatty Acid	Antimicrobial (Pan *et al.*, 2011).
36.	Methyl tetradecanoate	29.310	0.264	Fatty Acid Methyl Ester	-

Anti-Inflammatory Activity

The MGT showed a predominance of diosgenin and gitogenin, steroidal sapogenins known for potent anti-inflammatory and antiproliferative actions. Diosgenin has been shown to inhibit COX-2 expression, TNF-α release, and NF-κB activation, and to induce apoptosis in inflammatory synoviocytes, suggesting a strong, direct anti-inflammatory mechanism (Wang *et al.*, 2015). Similarly, gitogenin exhibits antiproliferative and inflammation-suppressing effects through AMPK-mediated pathways (Liu *et al.*, 2022). On the other hand, SGT demonstrated a phytochemical profile enriched in β-sitosterol derivatives, squalene, oleic acid, and n-hexadecenoic acid, which are known to exert multimodal anti-inflammatory effects. β-Sitosterol modulates cytokine release and immune cell signalling rather than acting as a single-pathway inhibitor (Bouic, 2001). Fatty acids such as palmitic and oleic acid contribute to membrane stabilisation and reduction of inflammatory mediator synthesis, supporting a more sustained anti-inflammatory effect (Sales-Campos *et al.*, 2013). The market sample may provide stronger acute anti-inflammatory action, while SGT offers

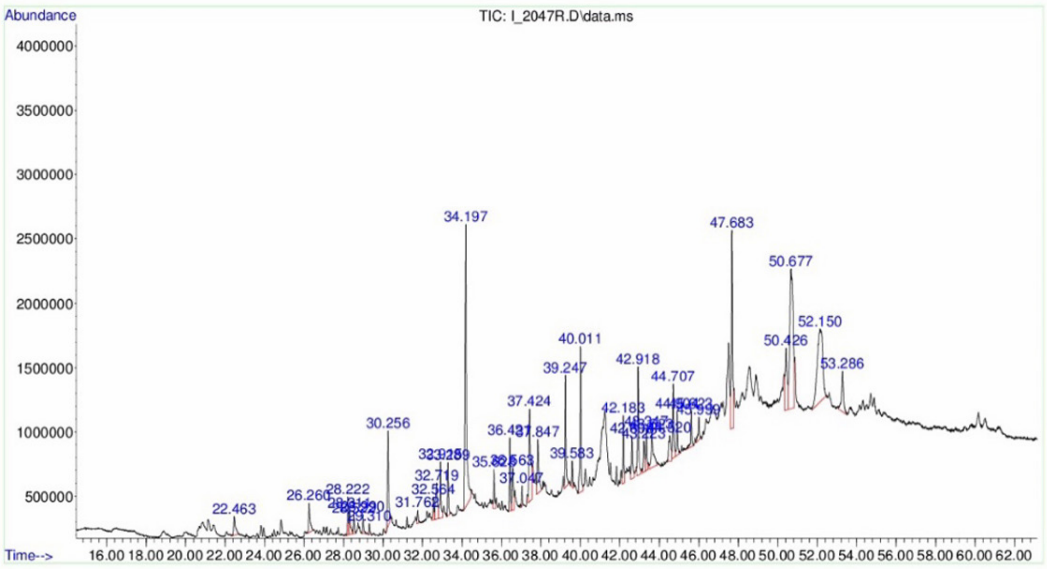

Figure 2: The Chromatogram of GC-MS Analysis of MGT.

Table 3: Common Phytochemicals in SGT and MGT.

Sl. No.	Phytochemical	Chemical Class	Reported Biological Significance
1.	n-Hexadecenoic acid (Palmitic acid)	Saturated fatty acid	Anti-inflammatory, Membrane Stabilizing (Aparna *et al.*, 2012).
2.	Octadecanoic acid (Stearic acid)	Saturated fatty acid	Anti-inflammatory, Hepatoprotective (Pan *et al.*, 2011).
3.	Oleic acid	Monounsaturated fatty acid	Anti-inflammatory, Immune Regulation (Carrillo *et al.*, 2012).
4.	Squalene	Triterpene	Antioxidant (Ibrahim & Naina Mohamed, 2021), Chemoprotective.
5.	Cholesterol / Phytosterol derivatives	Sterol lipid	Immunomodulatory (Plat & Mensink, 2005), Membrane Integrity.
6.	Dodecanoic acid (Lauric acid)	Medium-chain fatty acid	Antimicrobial, Antioxidant (Matsue *et al.*, 2019).

broader, regulatory anti-inflammatory control, aligning with long-term inflammatory and degenerative conditions.

Antioxidant Activity

Antioxidant activity differed substantially between the two samples. SGT showed higher representation of squalene, maltol, phytosterols, and oleic acid, all of which are established antioxidants capable of inhibiting lipid peroxidation and scavenging free radicals (Smith, 2000; Sales-Campos *et al.*, 2013; Lagarda *et al.*, 2006). Squalene, in particular, protects cell membranes from oxidative damage and enhances cellular resilience under chronic oxidative stress. The market sample, although containing antioxidant fatty acids, exhibited less selective enrichment of potent antioxidant molecules, resulting in comparatively diffuse antioxidant potential. SGT demonstrates superior antioxidant capacity, which may translate into enhanced *Rasayana* (rejuvenative) and tissue-protective effects, especially in chronic inflammatory and metabolic disorders.

Immunomodulatory Effects

Immunomodulation by *Guduchi* is well documented, involving macrophage activation, cytokine regulation, and immune homeostasis. In this context, SGT's sterol-rich profile supports balanced immune modulation, as phytosterols influence immune cell membrane dynamics and cytokine signalling without causing immune suppression (Aherne & O'Brien, 2008). The MGT, dominated by diosgenin and sapogenins, may exert stronger immunosuppressive or antiproliferative effects, which are beneficial in hyper-immune states but may not support long-term immune balance. SGT is better suited for immune regulation and strengthening, whereas the market sample may be more appropriate for conditions requiring immune down-regulation.

Table 4: Phytochemicals Identified by GC-MS and their Activity as Antioxidant, Anti-inflammatory and Chemoprotective.

Phytochemical	Sample Presence	Anti-inflammatory Activity	Antioxidant Activity	Chemoprotective / Anticancer Activity
Diosgenin	MGT > SGT	↓ COX-2, TNF-α, NF-κB inhibition (Liagre *et al.*, 2004).	Moderate	Strong (apoptosis induction) (Jesus *et al.*, 2016).
β-Sitosterol / derivatives	SGT > MGT	Cytokine modulation (Bouic, 2001).	Moderate	Chemopreventive
n-Hexadecenoic acid	Both	Proven anti-inflammatory (Aparna *et al.*, 2012).	Mild	Limited
Oleic acid	Both	Immunomodulatory (Carrillo *et al.*, 2012).	Moderate	Indirect
Squalene	SGT > MGT	Anti-inflammatory (Ibrahim & Naina Mohamed, 2021).	Strong (lipid peroxidation ↓).	Chemoprotective
Maltol	SGT	Mild	Strong free-radical scavenger (Song *et al.*, 2015).	Protective
Digin / Gitogenin	MGT	Anti-inflammatory (Liu *et al.*, 2004).	Moderate	Antiproliferative
Lauric acid	Both	Mild	Moderate	Antimicrobial synergy (Jo *et al.*, 2020).

Chemoprotective and Anticancer Potential

Chemoprotective activity also differed between the samples. Diosgenin and gitogenin, predominant in the market sample, are strongly associated with apoptosis induction, cell-cycle arrest, and anticancer activity, particularly in inflammatory and hormone-dependent cancers (Raju & Bird, 2007; Shishodia & Aggarwal, 2005). Conversely, SGT showed higher levels of squalene, β-sitosterol, and maltol, compounds associated with chemoprevention rather than direct cytotoxicity, acting by reducing oxidative stress, inflammation, and DNA damage (Smith, 2000; Woyengo *et al.*, 2009).

Although both the samples are processed through *Shatapaka Avartana* (100 times processing) and analysed at KFRI Thrissur, there are differences in phytochemicals which can be linked to raw material variability, variations in duration of heat and temperature which can lead to thermal transformation or variations of heat-sensitive compounds, and moisture control. Repeated heating may selectively enrich heat-stable lipophilic compounds while degrading others, leading to distinct GC–MS profiles even under nominally identical processing protocols (Ghosh & Saha, 2012; Patwardhan & Mashelkar, 2009). Thus, the difference in therapeutic action arises from selective phytochemical enrichment rather than the number of *paka* (processing) cycles alone, underscoring the importance of processing precision and raw material quality.

CONCLUSION

This pioneering GC-MS comparison of *Shatapaka Guduchi Taila* (SGT) and Market *Guduchi* Taila (MGT) reveals distinct phytochemical profiles despite identical 100-cycle *Avartana* processing. SGT exhibits superior antioxidant enrichment (squalene, phytosterols) for *Rasayana* effects and sustained anti-inflammatory action, while MGT dominates in steroidal sapogenins (diosgenin, gitogenin), favouring acute immunomodulation and chemoprevention. Variations underscore processing precision, raw material quality, and thermal transformations' impact on therapeutic outcomes. These findings validate classical *Avartana's* potency enhancement and advocate standardized protocols for consistent Ayurvedic lipid formulations in modern integrative medicine.

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ABBREVIATIONS

GC-MS: Gas Chromatography-Mass Spectrometry; **SGT:** Shatapaka Guduchi Taila; **MGT:** Market Guduchi Taila; **RT:** Retention Time; **TIC:** Total Ion Current/Chromatogram; **SI:** Similarity Index; **RI:** Retention Index; **GMP:** Good Manufacturing Practice; **KFRI:** Kerala Forest Research Institute; **CAI-K:** Centre for Analytical Instrumentation–Kerala; **IMPCOPS:** Indian Medical Practitioners' Co-operative Pharmacy Stores Ltd; **COX-2:** Cyclooxygenase-2; **TNF-α:** Tumor Necrosis Factor-alpha; **NF-κB:** Nuclear Factor kappa B; **AMPK:** AMP-activated Protein Kinase.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

SUMMARY

GC-MS analysis of Shatapaka Guduchi Taila (SGT) vs Market Guduchi Taila (MGT) reveals distinct phytochemical profiles despite identical 100-cycle *Avartana* processing. SGT shows superior antioxidant phytosterols for Rasayana effects; MGT dominates in anti-inflammatory diosgenin/gitogenin. Variations highlight the role of processing precision in therapeutic standardisation for modern Ayurvedic practice.

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