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Original Article

Pharmaceutico-Analytical Assessment of *Jeevanthyadi ghrita*-A Polyherbal *Ayurveda* Formulation and its Potential Benefits

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ABSTRACT

Background: Standardization and documentation of Traditional medicines have caught pace in recent past and yet remain a subject of discussion. *Jeevanthyadi ghrita* is a commonly prescribed empirically for debilitating health conditions. However, its pharmaceutical and analytical data remains untraced. Hence an attempt was made to prepare, screen the active biological constituents and review the recent activities of ingredients of the *Jeevanthyadi ghirta* to rationalize the classical indications. **Results:** Prepared *Jeevanthyadi ghrita* showed presence of Alkaloids and terpenoids. HPTLC analysis detected the presence of 7 and 11 active biological constituents at 254 nm and 366 nm respectively, which remains to be identified. No significant difference was noted between plain *ghrita* and prepared *Jeevanthyadi ghrita* in relation to AGMARK parameters. **Conclusion:** Recent activities of ingredients showed strong anti-inflammatory and immunomodulatory effect that has a relation in ceasing the pathology of debilitation.

Keywords: *Jeevanthyadi ghrita*, Debilitation, Anti-inflammatory, Alkaloids, Immunomodulatory, Pharmaceutico-Analytical.

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INTRODUCTION

Traditional Medicines are often chosen for chronic illness and there is no single best way for its documentation.[1,2] Perhaps, Ayurveda drugs are being used for varied pathological conditions and are seldom documented for all indications. Moreover, standardization of compound herbal formulation remains challenging, as it has many active biological constituents which remains unknown when tried to identify.[3] Recent advances in technology like High Power Thin Layer Chromatography (HPTLC) UV-Spectroscopy etc. are being used tools to analyze pharmaceutical products in a rational way.[4]

Jeevanthyadi ghrita [lipid-based compound formula] is one such formulation explained in Ayurveda in context of *Rajayaksham* that has been credited with qualities to cease the pathology of debilitation.[5] However, pharmaceutical analysis and clinical documentation of *Jeevanthyadi ghrita* have not been done despite its empirical usage.

Rajayaksham is a defined as a chronic debilitating disorder in Ayurveda. It is even quoted as *Roga samuha* [syndrome]. Dysregulate Oja [Immune system] is mentioned as the substrate for developing debilitation. This can happen due to four *Nidan* [etiology] namely, *ayatha balamaarambham* [physical activity surpassing one's own capacity], *vega sandharana* [suppression of the natural physiological urges], *kshaya* [depletion of tissue elements], and *vishamashanam* [irregular and unhealthy dietary habits], these etiological factors have the ability to aggravate the *vata dosha*. This unbalanced *vata dosha* is then responsible for derangement of all physiological processes and the vitality in the body i.e *Oja. Rajayaksham* exacerbates majorly with eleven symptoms and/or affecting various parts of the body like head, chest, back, rectum and joints based on localization of imbalanced *vata*.[6] Hence the study was aimed to analyze *Jeevanthyadi ghrita* and rationalize its potential classical indications through recent activities of its individual ingredients.

MATERIALS AND METHODS

Materials

Raw ingredients of *Jeevanthyadi ghrita* [Table 1] were procured from different reliable sources. Out of 14 herbs, 11 herbs were given for academic purpose by Dabur India Ltd., New Delhi, India. *Trayamana* [*Gentian Kurroo* Royle.] was procured from

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Table 1: Ingredients of *Jeevanthyadi ghrita*.

Sl. No.	Drug	Latin name	Part	Source
1	Jeevanti	*Leptadenia reticulata* Wight and Am.	Stem	Dabur India Ltd.
2	Yasthimadhu	*Glycyrrhiza glabra* Linn.	Root	
3	Draksha	*Vitis vinifera* Linn.	Fruit	
4	Kutaja	*Holerrhena antidysentrica* Wall.	Stem Bark	
5	Pushkaramula	*Inula racemosa* Hook. F.	Root	
6	Sati	*Hedychium spicatum* Ham. Ex Smith.	Rhizome	
7	Pippali	*Piper longum* Linn.	Fruit	
8	Gokshura	*Tribulus terrestris* Linn.	Fruit	
9	Bala	*Sida cordifolia* Linn.	Root and stem	
10	Nilothpala	*Nymphaea nouchali* Burm.F.	Flower	
11	Bhumyamalaki	*Phylanthus amarus* Schum. and Thonb.	Whole Plant	
12	Kantakari	*Solanum surattense* Burm. F.	Root	GMP Certified KLE Ayurveda Pharmacy.
13	Duralabha	*Fagonia cretica* Linn.	Whole Plant	
14	Trayamana	*Gentian Kurroo* Royle.	Rhizome	Natural Habitat.
15	Ghrita	*Hallikar Breed* Cow.		Karnataka.

its natural habitat and then authenticated at the Indian Council of Medical Research National Institute of Traditional Medicine [ICMR-NITM] Belagavi, Karnataka [Herbarium accession number RMRC-1677]. *Kantakari* [*Solanum surattense* Burm. F.], *Duralabha* [*Fagonia cretica* Linn.] were procured from GMP-certified KLE Ayurveda Pharmacy, Belagavi, Karnataka, India.

Ghrita/ghee prepared from the traditional fermentation method was procured from a farm at Kushalnagar, Madikeri District, Karnataka, India. The milk procured for preparing *ghrita* was from a native distinct breed named Hallikar cow which were reared on the same farm [Figure 1].

Methods

Preliminary Analysis of Raw Ingredients

All of the ingredients were re-authenticated and analyzed for macroscopic features [Table 2], Preliminary Physico-chemical [Table 3] and Phytochemical Analysis [Table 4] were carried out at KAHER's Shri B M Kankanawadi Ayurveda Mahavidyalaya's AYUSH approved Ayurveda Siddha Unani-Drug Testing Laboratory of Central Research Facility, Belagavi, Karnataka, India.[7]

Drug preparation: *Jeevanthyadi ghrita*

As per Ayurveda Formulary of India, the standard operating ratio of *ghrita* preparation [*Kalka:Ghrita:Jala*-1:4:16] was chosen and followed accordingly to prepare in quantum mentioned below [Table 5]. *Ghrita* was boiled until classical *Sneha siddhi* lakshana (traditional parameter for quality assessment) were achieved [Figure 2]. Processed *Jeevanthyadi ghrita* was stored in a sterile container.[8]

Drug Analysis: *Jeevanthyadi ghrita* Analysis

Plain ghee and Processed ghee (*Jeevanthyadi ghrita*) were analyzed for ghee standards as per AGMARK at ESSAR Laboratories and Research Centre [Government of India Approved AGMARK Laboratory, ISO 9000:2015 certified and NABL Accredited], Keshwapur, Hubli, Karnataka, India.

Phytochemical Screening and HPTLC Analysis of processed *Jeevanthyadi ghrita* were carried out at CARe Keralam Ltd., Koratty, Thrissur, India. [Test report number: CKL/22/ T376] for standardization.

High-Performance Thin Layer Chromatography [HPTLC] Analysis

Normal Phase: At a distance of 12.5 mm each, 2 µL sample was applied in three bands of 8mm each on pre-coated silica gel 60 G 254 aluminum plates (5mm × 10 mm) with Linomat 5 applicator attached CAMAG HPTLC system, having WINCATS software. TLC chambers were pre-saturated with Toluene: Ethyl Acetate: Hexane (6:3:1) as mobile phase for 30 min and then the plates were developed. Developed plates were read using Densitometry TLC scanner 3 at 254 and 366 nm in UV cabinet. Anisaldehyde-Sulphuric Acid Reagent was used for Post Chromatographic derivatization.

Table 2: Macroscopic Description of Ingredients of *Jeevanthyadi ghrita*.

Sl. No.	Drug	Colour	Odour	Taste
1	Jeevanti	Dull yellow	Odourless	Bitter
2	Yasthimadhu	Yellowish Brown	Faint Character	Sweetish
3	Draksha	Dark Brown	Pleasant	Sweetish
4	Kutaja	Buff to Brownish	Odourless	Acrid and Bitter
5	Pushkaramula	External brown Internal Yellowish	Bitter and Camphoraceous	Aromatic and Camphoraceous
6	Sati	Dark brown	Camphoraceous	Bitter
7	Pippali	Greenish black	Aromatic	Pungent
8	Gokshura	Light yellow	Characteristic	Slight Astringent
9	Bala	Brownish	Not specific	Not specific
10	Nilothpala	Brownish	Characteristic	Not specific
11	Bhumyamalaki	Greenish brown	Indistinct	Slightly Bitter
12	Kantakari	Yellowish green	Not distinct	Bitter
13	Duralabha	Brownish green	Characteristic	Bitter
14	Trayamana	Dark brown with yellow patches	Characteristic Aromatic	Bitter

Table 3: Physico-chemical Analysis of Ingredients of *Jeevanthyadi ghrita*.

Sl. No.	Drug	FM %	AV %	AIV %	WSE %	ASE %
1	Jeevanti	Nil	6.28	1.48	5.83	1.91
2	Yasthimadhu	Nil	7.15	1.59	22.23	11.46
3	Draksha	Nil	1.89	0.14	82.98	33.49
4	Kutaja	Nil	6.55	0.88	15.93	22.18
5	Pushkaramula	Nil	4.88	0.34	25.82	14.34
6	Sati	Nil	7.87	1.37	9.10	7.82
7	Pippali	Nil	6.61	0.38	43.02	9.25
8	Kantakari	Nil	6.87	0.91	6.08	2.29
9	Gokshura	Nil	13.67	1.70	16.77	7.50
10	Bala	Nil	1.58	0.96	12.34	3.35
11	Nilothpala	Nil	12.94	3.32	29.00	7.07
12	Bhumyamalaki	Nil	6.37	0.91	15.07	4.76
13	Trayamana	Nil	6.45	1.77	31.58	29.53
14	Duralabha	Nil	9.08	0.39	24.07	6.71

Note: All the values were under the range as specified by Ayurveda pharmacopeia. FM – Foreign Matter, AV – Ash Value, AIV – Acid Insoluble Ash, WSE – Water Soluble Extract, ASE – Alcohol Soluble Extract. All these valves are expressed in Percentage.

RESULTS

Phytochemical screening of *Jeevanthyadi ghrita* demonstrated the presence of alkaloids and Terpenoids [Tables 6 and 7]. HPTLC analysis detected the presence of 7 and 11 active biological constituents at 254 nm and 366 nm respectively, which remains to be identified [Table 8 and Figures 3, 4, 5]. No significant changes were observed in AGMARK standards of Plain ghee and *Jeevanthyadi ghrita*.

DISCUSSION

Duraipandi S, *et al.* 2015 also investigated to understand the Ayurveda Lipid-based formulation *Guggulu tiktaka ghrita*.[9] They aimed to understand the age-old ayurveda engineering

Table 4: Qualitative Phytochemical screening of Ingredients *Jeevanthyadi ghrita*.

Sl. No.	Drug Name/Test Name	Jeevanthi		Yasthimadhu		Draksha		Kutaja		Pushakarmula		Sati		Pippali	
		WE	AE	WE	AE	WE	AE	WE	AE	WE	AE	WE	AE	WE	AE
1	Carbohydrate	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Monosaccharaides	+	--	+	+	--	--	+	+	+	+	+	--	--	+
3	Reducing Sugar	+	--	+	+	+	+	+	--	+	+	+	--	+	+
4	Pentose sugar	--	--	--	--	--	--	--	--	--	--	--	--	+	--
5	Hexose Sugar	--	--	--	--	--	--	--	+	--	--	--	--	--	--
6	Protein	--	--	+	--	--	--	--	+	--	--	--	+	--	--
7	Amino acid	--	--	+	--	--	--	--	+	--	--	--	+	--	--
8	Steroids	+	+	--	+	--	--	--	--	--	--	--	+	--	--
9	Cardiac Glycosides	--	--	--	--	--	--	--	--	+	--	--	--	+	+
10	Saponins	+	--	+	--	+	+	+	--	--	--	+	--	--	
11	Alkaloids	--	--	--	+	--	--	--	--	--	+	--	--	--	+
12	Flavonoids	+	--	+	--	--	--	+	--	+	+	--	--	+	+
13	Tannins	--	--	+	+	+	+	+	+	+	+	+	--	+	+

Sl. No	Drug Name/Test Name	Gokshur		Bala		Nilothpala		Bhumayamlaki		Kantakari		Durlabha		Trayamana	
		WE	AE	WE	AE	WE	AE	WE	AE	WE	AE	WE	AE	WE	AE
1	Carbohydrate	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Monosaccharaides	+	--	+	+	+	+	+	+	+	--	+	--	+	--
3	Reducing Sugar	+	--	--	--	+	--	--	+	+	+	+	--	--	--
4	Pentose sugar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5	Hexose Sugar	--	--	--	--	+	--	+	--	--	--	--	--	--	--
6	Protein	+	--	--	--	--	--	+	--	--	--	--	--	--	--
7	Amino acid	+	--	--	--	--	--	+	--	--	--	--	--	--	--
8	Steroids	+	+	+	+	+	+	--	--	--	+	+	+	--	--
9	Cardiac Glycosides	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Saponins	+	--	+	--	+	--	--	+	+	--	+	--	+	+
11	Alkaloids	--	+	--	+	--	--	--	--	--	--	--	--	--	+
12	Flavonoids	+	+	+	--	+	+	--	+	+	+	+	--	+	+
13	Tannins	+	+	+	+	+	+	+	+	+	--	+	--	+	--

Note: WE- Water Extract and AE- Alcoholic extract. '+' - presence and '-' - Absence.

Table 5: Ratio and quantum of ingredients used for *Jeevanthyadi ghrita* preparation.

Sl. No.	Particular	Ratio [classical method]	Taken for preparation
1	Kalka (paste of 14 drugs)	1 part	19.5 Kg
2	Ghrita	4 parts	78 L
3	Jala/Water	16 parts	312 L

involved in blending water-soluble constituents to lipid-soluble mode without using surfactants through HPTLC. It was evident through their study that active biological ingredients had eluted in *ghrita* in a monophasic oily liquid without any distinct layers. The HPTLC run with polar fractions demonstrated the presence of active biological ingredients while non-polar fractions did not. They proposed that hydrophilic contents may have been entrapped in a nano vesicular form in lipids which could control the drug delivery to targets, which seems undeniable. Pouton CW *et al.* 2000 stated that triglycerides present in foods undergo rapid

Table 6: Analysis of Plain and *Jeevanthyadi ghrita* for standard ghee parameters.

Sl. No.	Parameter	Plain *ghrita*	*Jeevanthyadi ghrita*	AGMARK Specifications
1	Baudouin test	Negative	Negative	Negative
2	Butro-Refractometer @ 40°C	41.6	42.2	40-43
3	Reichert Meissel Value	25.6	26.5	Min 24
4	Polenske Value	1.40	1.36	1.0- 2.0
5	Moisture Content	0.32%	0.30	0.3-0.5
6	Free Fatty acid (as oleic)	1.14%	1.24	2.8 Max
7	Colour	7.50	7.90	10
8	Saturated Fat	65.5%	67.5%	-
9	MUFA	17.6%	18.2%	-
10	PUFA	2.80%	2.50%	-
11	DHA	0.04%	0.03%	-
12	Milk Fat	99.2%	99.26%	99-99.5
13	Cholesterol	0.18%	0.20%	0.5 Max

Table 7: Phytochemical Screening and Quantification of *Jeevanthyadi ghrita*.

Sl. No.	Parameter	Result	Method/Test Used	Value	Method used
1	Alkaloids	Present	Dragendroff's reagent test	0.32%	Experimental Phyto pharmacognosy
2	Flavonoids	Absent	Shinoda test	---	CKL/ANL/UV-OO3
3	Glycosides	Absent	Picric acid test	---	Not Done
4	Phenols	Absent	Folin ciocalteu reagent	---	CKL/ANL/UV-OO2
5	Saponins	Absent	Foam test	---	Standardization of Botanicals
6	Tannins	Absent	Lead Acetate test	---	CCRAS 40.3
7	Terpenoids	Present	Salkowski reaction test	---	Not Done
8	Steroid	Absent	Salkowski reaction test	---	Not Done

Table 8: R_f Values of HPTLC Analysis at 254 nm and 366 nm wavelengths.

Sl. No.	254 nm R_f	% of Compound	366 nm R_f	% of Compound
1	0.01	11.76	0.01	7.76
2	0.04	4.09	0.07	6.52
3	0.19	8.32	0.21	14.14
4	0.36	8.01	0.29	4.74
5	0.57	10.71	0.36	13.70
6	0.67	17.88	0.39	3.28
7	0.73	39.32	0.42	7.63
8			0.56	13.69
9			0.59	3.59
10			0.74	9.67

digestion to form free fatty acids and 2–monoglycerides, which form colloidal dispersion of mixed micelles with bile salt-lecithin. Similarly, in this environment, lipid-based formulations containing hydrophobic drugs or poorly water-soluble drugs get solubilized.[10] This drug reservoir can lead to a partition that allows efficient, passive [transcellular] absorption of drugs

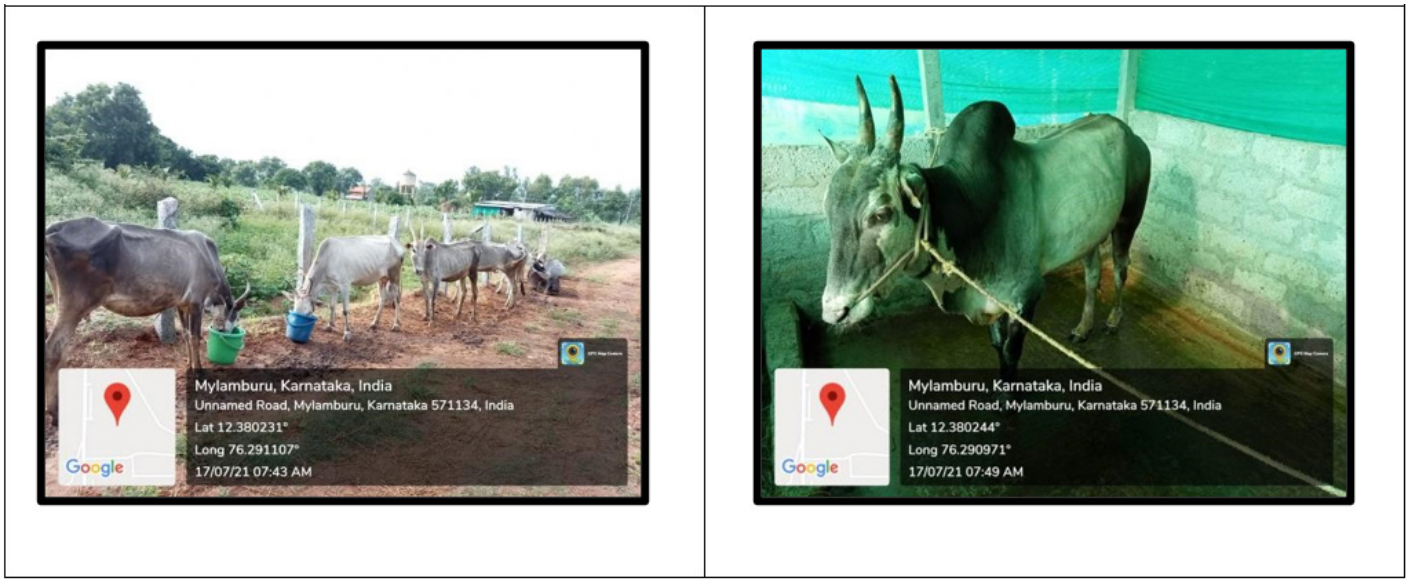

Figure 1: Hallikar Cow and Farm.

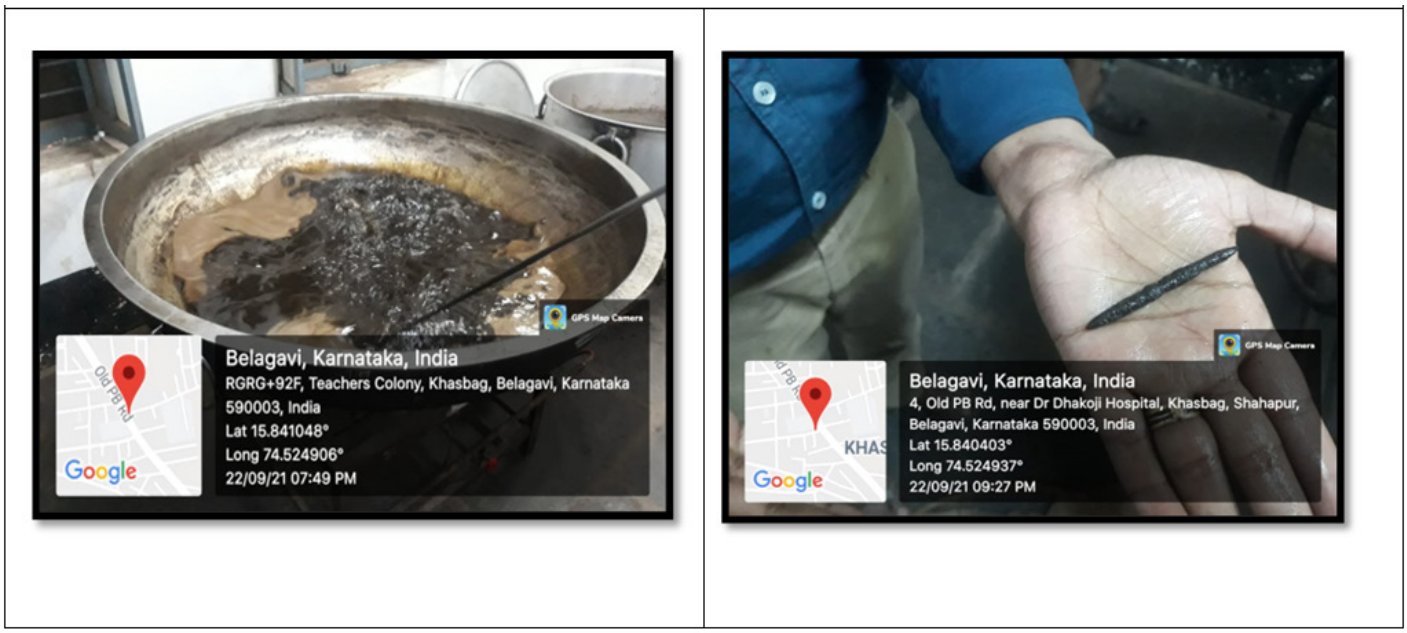

Figure 2: Ghee Processing and Siddhi Lakshana.

and prevents drug precipitation.[11] This can impact kinetics and improve bioavailability by supersaturation [intestinal absorption] and lymphatic transport.[12] These studies help to ascertain that even hydrophilic or water-soluble drugs can be targeted for purposed indications by modifying their pharmaceutical formulation. Hence nowadays the food-drug concept is evolving which was ascribed in ayurveda much before.[13] These theories explain the concept of usage of one formulation in various pharmaceutical dosage forms for target drug delivery.

Ekadasharupa of *Rajayaksham* presents symptoms like *shiroruja* [headache], *kantha dhwamsa* [dysphonia], *kasa* [cough], *svarabheda* [hoarseness of voice], *aruchi* [loss of appetite], *parshvashula* [pain in lateral side of chest], *atisara* [diarrhea], *jrumbha* [yawning], *jvara* [fever], *ura shola* [pain in the chest], *jarjarena uras* [expelling blood with phlegm] that have been correlated and studied for similarity in chronic debilitating illnesses like pulmonary tuberculosis[14] and HIV infections.[15,16] In the recent past, few opined that the acute phase of COVID-19 presents with *shadrupa* [six symptoms] and *Ekadasharupa* [eleven symptoms] of *rajayaksham*.[17] Emerging evidence of LONG TERM COVID-19 syndrome also has shown symptoms of *Rajayaksham* like chronic fatigue syndrome, headache, Allergic rhinitis, chest pain, change in taste, reduced appetite, dyspnea, memory issues, muscle/joint pain and often fever and cough especially in children.[18-21]

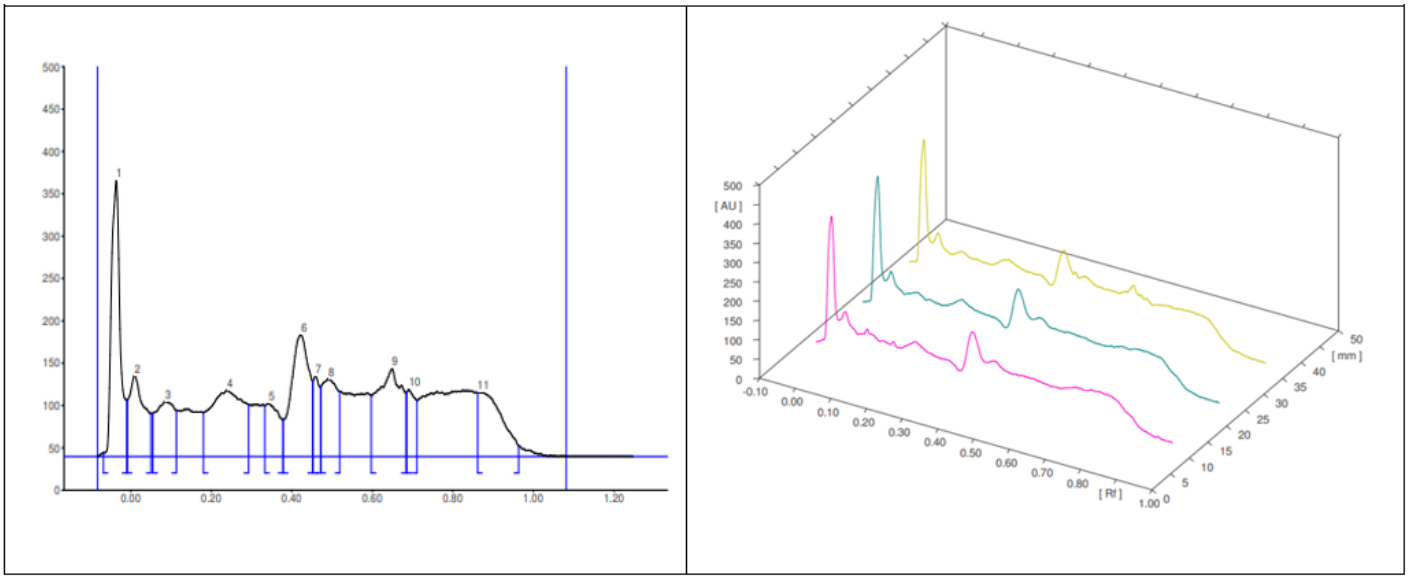

Figure 3: HPTLC of *Jeevanthyadi ghrita* at 366nm.

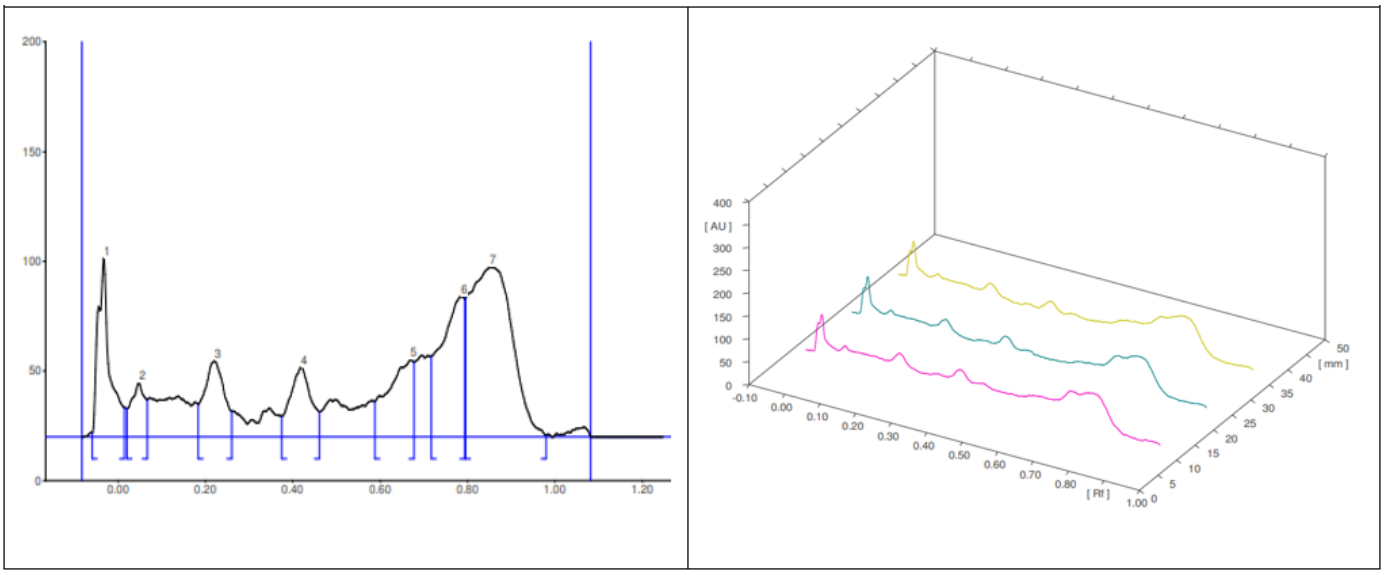

Figure 4: HPTLC of *Jeevanthyadi ghrita* at 366nm 254 nm.

On the other hand, it has also been observed that cancer therapies like radiation, chemotherapy and immunotherapy present with symptoms like gastrointestinal mucositis, fatigue, pain, body ache, sleep deprivation, and recurrent infection, etc., that have a negative impact on nutritional status leading to debilitation.[22,23]

All the above conditions that have been approximated with *Rajayaksham* have a common substrate of compromised or aberrant immune system which is orchestrated by interleukins [IL-6], tumor necrosis factor-α, nuclear factor-κB, T Helper cells like reduced CD4 and CD8 cells.[19,24-26] A compromised immune system can lead to tissue wasting.[27] This has been considered as *Ojakshaya* in Ayurveda.[28] *Ghrita* has been considered as *ojakara*[29] [immunomodulatory] and attributed with quality of *samskarasya anuvartathte* [~ selective synergistic agonist/ antagonistic] which means that *ghrita* can carry medicinal properties of herbs without forfeiting its own qualities.[30]

Jeevanthyadi ghrita is a formulation which is rich in Alkaloids and has also shown presence of terpenoids. Alkaloids are a large category of secondary plant molecules comprising of one or more nitrogen atoms. Alkaloids are considered as a chief phytoconstituents which help for performance enhancement and improving immune functions.[31]

Recent research on the ingredients of *Jeevanthyadi ghrita* has shown substantial anti-inflammatory, immunomodulatory and free radical scavenging activities. Preclinical studies on triterpenoids in aqueous extract of *Leptadenia reticulata* have downregulated pro-inflammatory cytokines like IL-2, Il-6, TNF-α and inhibited lipid peroxidation indicating its anti-inflammatory,

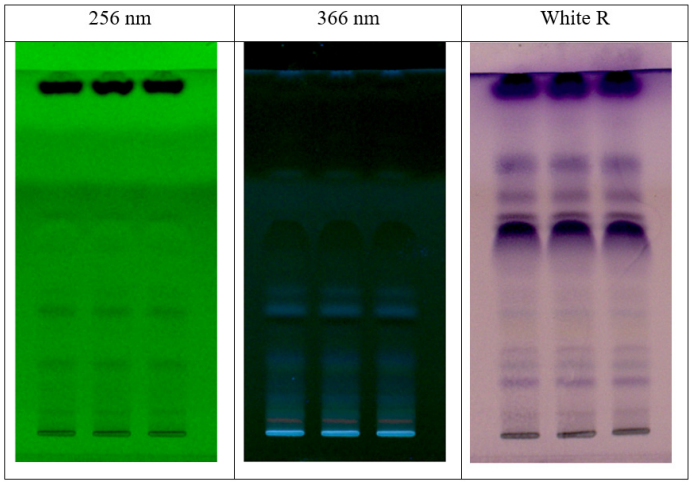

Figure 5: Image information of HPTLC of *Jeevanthyadi ghrita* at 254nm and 366 nm.

immunomodulation, analgesic, anti-pyretic and anti-cancerous activity.[32-35]

Yang R *et al.* 2016 showed that the anti-inflammatory and immunomodulatory activity can be attributed to 3 triterpenes and 13 flavonoids of *Glycyrrhiza Glabra* through a diverse route of mechanisms, especially downregulation of mediators, such as TNF-a, Matrix Metalloproteinase [MMPs], Prostaglandin E2 [PGE2], and oxidative stress on the progression of inflammation-related diseases. Glycyrrhizin exerts an anti-inflammatory action similar to hydrocortisone and other corticosteroid hormones. It inhibits phospholipase A2 activity and glycyrrhizic acid helps in inhibiting cyclooxygenase and prostaglandin formation.[36-39]

Hydro-ethanolic extract of Draksha (*Vitis Vinifera* L) inhibited pro-inflammatory markers like interleukin-6 and NF-κB transcription and downplay its successive markers through Mitogen-Activated Protein Kinase [MAPK] pathway in Lipopolysaccharide [LPS] induced inflammation. *Vitis Vinifera* can regulate leptin gene expression which is deranged in chronic inflammation via the TNF-α, IL-1β and NF-κB pathways.[40,41] different extracts of *Holarrhena Anti-dysentrica* stem bark have shown analgesic and radical scavenging activity.[42,43]

Alantolactone a sesquiterpene lactone found in *Inula racemosa* could elicit and confirm the pathway of inflammation inhibition. It was seen that extract of *Inula racemosa* was by inhibiting [LPS] induced NO production, Prostaglandin E2, TNF-alpha, Inducible nitric oxide synthase [iNOS] and COX-2.[44-46]

Methanolic extract of *Hedychium spicatum* has demonstrated for immunomodulatory effect in *in vivo* in dose-dependent manner against induced abdominal sepsis through *E. coli* and also could reverse the cyclophosphamide-induced myelosuppression.[47] Different extracts of *Hedychium spicatum* including aqueous have shown anti-inflammatory and analgesic activity in guinea pigs and mice respectively.[48]

Piperine and β-Sitosterol from pippali have shown anti-inflammatory activity by attenuating nuclear factor- κB (NF-κB) and inhibiting TNF-α induced Intercellular Adhesion Molecule-1 (ICAM-1) in endothelial cells. Piperine has also shown anti-inflammation in radiation-induced lung tissue damage in Sprague Dawley rats when irradiated for six weeks, it could anchor the Tumor Necrosis Factor alpha (TNF-α), Interleukin-1β (IL-1β) and Interleukin-6 (IL-6) and able maintain anti-oxidant enzymes like Superoxide Dismutase (SOD), Catalase (CAT) and Glutathione Peroxidase (GPx) in normal range.[49,50]

Alcoholic extract of *Solanum xanthocarpum* showed an Analgesic effect that was comparable to the standard drug Pentazocin.[51] *Tribulus terrestris* inhibited IL-6, TNF-α and is able to regulate GSH activity and bring down Malonaldehyde (MDA) which are responsible for immunomodulation and prevent cell damage.[52] Different organic extracts of *Sida cordifolia* were tested for anti-inflammatory activity using molecular markers like Prostaglandins (PGs, PGE2, PGD2, PGF2) and Thromboxane A2 (TXA2) even at the lowest dose of 10 μg/mL in the supernatant of Lipopolysaccharide (LPS)- induced RAW 264.7 cells.[53]

Nymphea nouchali showed anti-nociceptive and anti-depressant activity in a dose-dependent manner over pain which was comparable to diclofenac sodium which was persistent until 90 min.[54] *N nouchali* can mediate nuclear factor (erythroid derived2) NrF2 which is a key player in this pathway to phosphorylation of MAP kinase, extracellular signal regulated kinase 1 and 2 and p38, which confirms its antioxidant activity and DNA protection in oxidative stress.[55]

Ethanolic extract of *Phyllantus amarus* roots could regulate NF-κB gene and attenuate mRNA expression of TNF-α, IL-1β, PGE 2and COX-2 caused by phosphorylation of MAP kinase signaling induced by LPS in U937 macrophages.[56] Methanolic extract of *Gentiana kurroo* Royle showed a decrease in the release of pro-inflammatory mediators namely NO, TNF-α and IL-6 and even the expression of NF-Kappa B in mice peritoneal macrophages when stimulated by LPS which is the major transcription factor for above mediators.[57] *Fagonia indica* another variety of fagonia genus was able to down-regulate the Toll Like Receptors 4 and 9 genes which are responsible for innate immunity and pro-inflammatory markers like IL-6, Il-1B, TNF-Alpha and TGF-β.[58]

CONCLUSION

Jeevanthyadi ghrita has shown presence of alkaloids and terpenoids in phytochemical screening, HPTLC could elucidate few peaks which remains to be identified. Recent studies on ingredients of *Jeevanthyadi ghrita* rationalize the classical indications of it, based on inflammation as a substrate of pathophysiology.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

SUMMARY

Jeevanthyadi ghrita was prepared as per classical method after collecting authenticated raw drugs. Prepared jeevanthyadi ghrita was subjected to HPTLC evaluation, preliminary phytochemical screening and standard ghee parameters [AGMARK]. *Jeevanthyadi ghrita* showed 7 and 11 peaks in HPTLC analysis, presence of Alkaloids and terpenoids in phytochemical screening and AGMARK parameters as per standard references. Review on recent activities of individual drugs of *Jeevanthyadi ghrita* showed strong anti-inflammatory and immunomodulatory effects which rationalizes its classical indications.

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