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COMPARATIVE PHYTOCHEMICAL EVALUATION OF PARIJATA (NYCTANTHES ARBOR-TRISTIS LINN.) AND NIRGUNDI (VITEX NEGUNDO LINN.) USED IN THE MANAGEMENT OF GRIDHRASI (SCIATICA)

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ABSTRACT

Background: Gridhrasi (Sciatica) is a common Vatavyadhi characterized by radiating pain, stiffness, and restricted mobility. Ayurvedic texts widely prescribe Parijata and Nirgundi Patra in the management of Gridhrasi due to their proven Vata-Kapha Shamaka and Vedanahara properties. Modern pharmacology attributes these effects to their rich phytochemical profiles. **Aim:** To comparatively evaluate the phytochemical profiles of Parijata Patra and Nirgundi Patra used in the treatment of Gridhrasi, and to correlate their constituents with therapeutic actions. **Materials and Methods:** Aqueous extracts of authenticated *Nyctanthes arbor-tristis* and *Vitex negundo* leaves were analyzed at the Siddha Central Research Institute (SCRI), Chennai. qualitative phytochemical profiling, and HPTLC fingerprinting (254 nm & 520 nm) were performed following AYUSH/API protocols. **Results:** Both drugs showed the presence of alkaloids, flavonoids, glycosides, tannins, sterols, saponins and phenolic compounds. Parijata revealed abundant flavonoids (nyctanthin), tannins, β-sitosterol, iridoid glycosides, while Nirgundi demonstrated strong presence of iridoid glycosides (negundoside, agnuside), vitexin, casticin, and volatile oils (1,8-cineole, sabinene, β-caryophyllene). Physicochemical constants were within standard limits for both samples. HPTLC under 254 nm and 520 nm revealed

distinct and characteristic fingerprints for each drug. Nirgundi exhibited a greater number of peaks with higher intensity at both wavelengths, indicating richer phytochemical diversity. **Conclusion:** Both Parijata and Nirgundi possess rich phytochemical profiles correlating with their analgesic, anti-inflammatory, antioxidant, and neuroprotective actions beneficial in Gridhrasi. However, Nirgundi contains relatively higher concentrations of iridoid glycosides and volatile oils, and HPTLC under 254 nm and 520 nm revealed distinct and characteristic fingerprints for each drug. Nirgundi exhibited with higher intensity at both wavelengths, indicating richer phytochemical diversity. which may explain its slightly stronger Vedanahara and Shothahara activity compared to Parijata.

KEYWORDS: Parijata, Nirgundi, Phytochemical evaluation, Gridhrasi, Sciatica, Vedanahara.

INTRODUCTION

Gridhrasi, one among the Vatavyadhi, is characterized by radiating pain from Sphik to Pada, with stiffness, tingling, and functional limitation as described in Ayurvedic classics.[1,2] The clinical features closely resemble sciatica, which results from irritation or compression of the lumbosacral nerve roots.[3] Modern management includes analgesics, steroids, physiotherapy, and surgery, which may not always provide sustained relief and often carry adverse effects.

Ayurveda offers several herbal drugs with Vata-Kapha Shamana, Vedanahara, and Sothahara effects, among which Parijata *(Nyctanthes arbor-tristis)* and Nirgundi *(Vitex negundo)* are prominently recommended.[4,5] Their therapeutic actions are linked to phytochemicals such as iridoids, flavonoids, glycosides, sterols, and volatile oils, many of which exhibit strong anti-inflammatory and analgesic activity.[6,7]

Standardization through phytochemical evaluation is essential for ensuring drug authenticity, potency, and therapeutic predictability. Thus, this study aims to compare the phytochemical profiles of Parijata and Nirgundi, specifically in the context of their application in Gridhrasi.

MATERIALS AND METHODS

Plant Materials

Fresh leaves of Nyctanthes arbor-tristis and Vitex negundo were collected, shade dried, powdered, and authenticated at the National Institute of Siddha, Chennai.

Phytochemical analysis

All the phytochemical parameters were carried out as per the standard test procedures (Harborne JB. Phytochemical Methods, Chapman and Hall, London, 1973).

Sample Preparation

1gm of the sample was sonicated with 10 ml aqueous (Distilled water) for 10 minutes. The extract was filtered and taken in a sample analysis.

Preliminary Phytochemical Screening

Qualitative tests were performed for

Alkaloids

Flavonoids

Tannins

Glycosides

Phenolic compounds

Sterols

Saponins

Volatile oils

HPTLC Analysis

Sample Preparation

1gm of the sample was sonicated with 10 ml aqueous (Distilled water) for 10 minutes. The extract was filtered and taken in a sample analysis.

METHODOLOGY

5, 7, 10µl of the extract was applied on silica coated TLC plate (60 F254) using Camag's TS4 applicator and developed in Twin trough chamber (CAMAG) (10× 10 cm), previously saturated with the mobile phase Toluene: Ethyl acetate: Methanol: formic acid (6:3:0.5:0.5) v/v/v. The plate was developed up to 85 mm from the bottom. Then the plate was scanned using Camag's Scanner 4 at λ 254 nm (D2 lamp, Absorption mode) finger print profiles of the extract was performed. Subsequently the plate was dipped in vanillin sulphuric acid solution followed by heating at 105oC till development of the coloured spots. The plate was scanned at 520 nm (W lamp, Absorption mode)

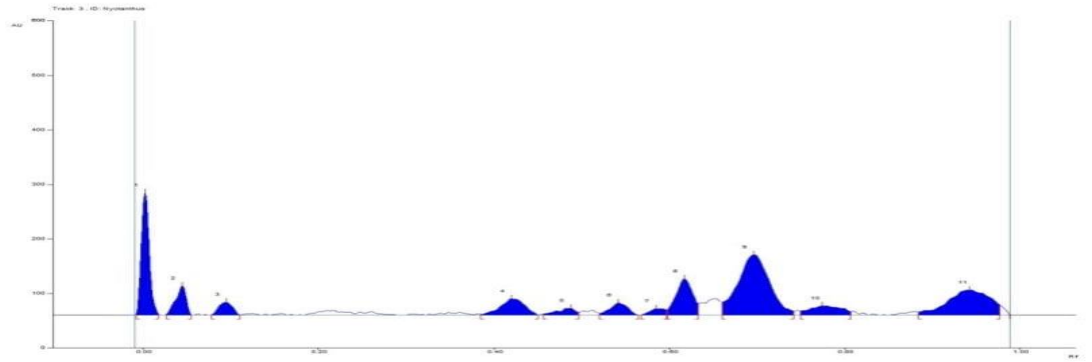
RESULTS

Phytochemical Screening

Phytochemical	Parijata	Nirgundi
Alkaloids	Abscent	Abscent
Flavonoids	Present	Present
Sugar	Present	Abscent
Tannins	Present	Present
Steroids	Present	Present
Saponins	Present	Abscent
Reducing sugar	Abscent	Abscent
Acid	Abscent	Abscent
Quinone	Present	Abscent
Anthraquinones	Abscent	Present
Proteins	Abscent	Abscent
Triterpenoids	Abscent	Present
Phenols	Present	Present
Coumarin	Present	Present

Both Parijata and Nirgundi showed the presence of phenols, tannins, flavonoids, steroids and coumarins. Triterpenoids and anthraquinones were present only in Parijata. Sugars, quinones and saponins were present only in Nirgundi. Alkaloids, proteins, reducing sugars and acids were absent in both samples.

HPTLC Profile of *Nyctanthes arbor-tristis Linn aquious extract scanning at 254nm.*



Track 3, ID: Nyctanthus

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	-0.01 Rf	1.5 AU	0.00 Rf	224.1 AU	36.28 %	0.02 Rf	2.0 AU	1819.0 AU	15.81 %
2	0.03 Rf	0.6 AU	0.04 Rf	53.7 AU	8.69 %	0.05 Rf	1.1 AU	567.2 AU	4.93 %
3	0.08 Rf	0.5 AU	0.09 Rf	23.3 AU	3.78 %	0.11 Rf	0.0 AU	333.6 AU	2.90 %
4	0.39 Rf	1.3 AU	0.42 Rf	29.9 AU	4.84 %	0.45 Rf	0.2 AU	738.1 AU	6.42 %
5	0.46 Rf	2.0 AU	0.49 Rf	12.5 AU	2.02 %	0.50 Rf	5.2 AU	234.5 AU	2.04 %
6	0.52 Rf	3.2 AU	0.54 Rf	22.3 AU	3.61 %	0.57 Rf	0.0 AU	401.7 AU	3.49 %
7	0.57 Rf	0.2 AU	0.59 Rf	11.8 AU	1.91 %	0.60 Rf	9.9 AU	181.9 AU	1.58 %
8	0.60 Rf	10.1 AU	0.62 Rf	66.4 AU	10.75 %	0.63 Rf	21.0 AU	1120.7 AU	9.74 %
9	0.66 Rf	23.6 AU	0.70 Rf	110.8 AU	17.94 %	0.74 Rf	6.8 AU	3553.6 AU	30.88 %
10	0.75 Rf	7.8 AU	0.78 Rf	16.9 AU	2.74 %	0.81 Rf	6.3 AU	564.5 AU	4.91 %
11	0.89 Rf	5.7 AU	0.94 Rf	46.0 AU	7.45 %	0.98 Rf	19.1 AU	1991.4 AU	17.31 %

HPTLC analysis of the aqueous extract of Parijata showed 11 distinct peaks at 254 nm, indicating the presence of multiple phytoconstituents. The prominent peaks were observed at the following Rf values with corresponding area percentages:

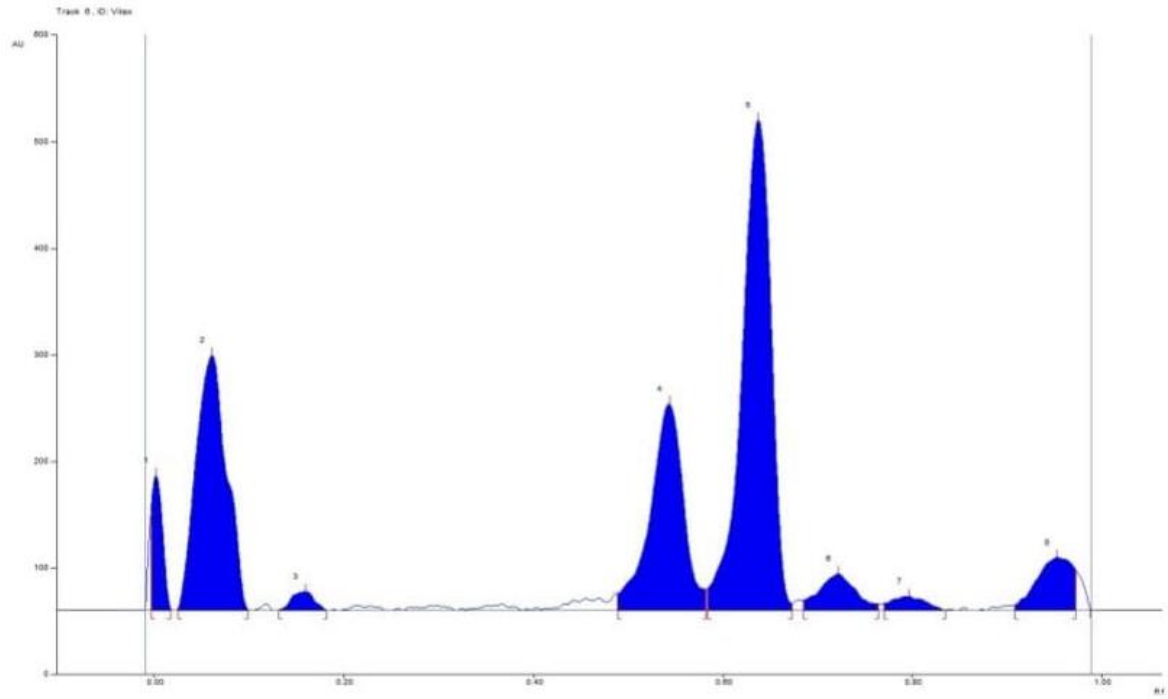
Major peaks at Rf 0.70 (30.88%), Rf 0.94 (17.31%), and Rf 0.00 (15.81%)

Moderate peaks at Rf 0.62 (9.74%), Rf 0.42 (6.42%), and Rf 0.04 (4.93%)

Minor peaks at Rf 0.09, 0.49, 0.54, 0.59 and 0.78

This indicates that Parijata contains a chemically diverse set of UV-absorbing compounds in the aqueous extract.

HPTLC Profile of *Vitex negundo Linn aquious extract scanning at 254nm*



Track 6, ID: Vitex

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	-0.00 Rf	92.7 AU	0.00 Rf	126.5 AU	11.16 %	0.02 Rf	1.7 AU	1307.8 AU	4.28 %
2	0.02 Rf	1.3 AU	0.06 Rf	239.3 AU	21.10 %	0.10 Rf	0.6 AU	6935.8 AU	22.67 %
3	0.13 Rf	0.1 AU	0.16 Rf	17.5 AU	1.54 %	0.18 Rf	0.2 AU	375.3 AU	1.23 %
4	0.49 Rf	16.1 AU	0.54 Rf	193.6 AU	17.07 %	0.58 Rf	19.6 AU	6060.4 AU	19.81 %
5	0.58 Rf	20.2 AU	0.64 Rf	460.0 AU	40.57 %	0.67 Rf	6.3 AU	12640.4 AU	41.32 %
6	0.69 Rf	9.6 AU	0.72 Rf	34.1 AU	3.01 %	0.76 Rf	5.9 AU	1175.9 AU	3.84 %
7	0.77 Rf	6.4 AU	0.80 Rf	13.3 AU	1.18 %	0.84 Rf	0.2 AU	413.7 AU	1.35 %
8	0.91 Rf	4.6 AU	0.95 Rf	49.5 AU	4.37 %	0.97 Rf	37.7 AU	1681.4 AU	5.50 %

HPTLC Profile of Nirgundi (Vitex negundo Linn.) – Aqueous Extract (254 nm)

HPTLC analysis of the aqueous extract of Nirgundi revealed 8 distinct peaks at 254 nm. The major peaks were recorded at:

Rf 0.64 (41.32%) – dominant constituent

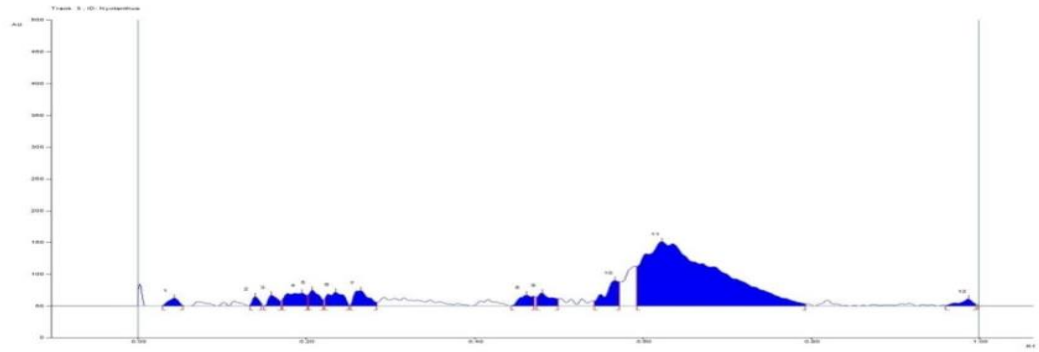
Rf 0.06 (22.67%)

Rf 0.54 (19.81%)

Moderate to minor peaks were observed at Rf 0.00 (4.28%), Rf 0.72 (3.84%), Rf 0.95 (5.50%), Rf 0.16 (1.23%), and Rf 0.80 (1.35%).

This indicates fewer but more dominant constituents in Nirgundi compared to Parijata.

HPTLC Profile of *Nyctanthes arbor-tristis Linn aquious extract scanning at 520nm*



Track 3, ID: Nyctanthus

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.03 Rf	0.1 AU	0.04 Rf	12.2 AU	3.77 %	0.05 Rf	0.5 AU	132.7 AU	1.19 %
2	0.13 Rf	0.4 AU	0.14 Rf	14.9 AU	4.59 %	0.15 Rf	3.8 AU	103.1 AU	0.93 %
3	0.15 Rf	0.0 AU	0.16 Rf	17.3 AU	5.32 %	0.17 Rf	7.7 AU	167.8 AU	1.51 %
4	0.17 Rf	9.0 AU	0.19 Rf	20.0 AU	6.18 %	0.20 Rf	16.4 AU	429.7 AU	3.86 %
5	0.20 Rf	17.6 AU	0.21 Rf	24.8 AU	7.64 %	0.22 Rf	9.3 AU	270.8 AU	2.43 %
6	0.22 Rf	11.0 AU	0.24 Rf	21.3 AU	6.58 %	0.25 Rf	0.7 AU	359.5 AU	3.23 %
7	0.25 Rf	0.0 AU	0.26 Rf	24.1 AU	7.42 %	0.28 Rf	5.3 AU	373.7 AU	3.36 %
8	0.44 Rf	0.2 AU	0.46 Rf	17.1 AU	5.26 %	0.47 Rf	15.4 AU	245.7 AU	2.21 %
9	0.47 Rf	13.8 AU	0.48 Rf	20.5 AU	6.34 %	0.50 Rf	11.3 AU	306.5 AU	2.75 %
10	0.54 Rf	7.5 AU	0.57 Rf	39.8 AU	12.28 %	0.57 Rf	37.7 AU	579.7 AU	5.21 %
11	0.59 Rf	62.1 AU	0.62 Rf	101.3 AU	31.23 %	0.79 Rf	3.3 AU	8012.0 AU	71.98 %
12	0.96 Rf	0.7 AU	0.99 Rf	11.0 AU	3.39 %	1.00 Rf	2.7 AU	150.2 AU	1.35 %

HPTLC fingerprinting of the aqueous extract of Parijata at 520 nm showed 12 distinct peaks.

A highly prominent peak was observed at:

Rf 0.62 (71.98% area) indicating a dominant chromophoric constituent

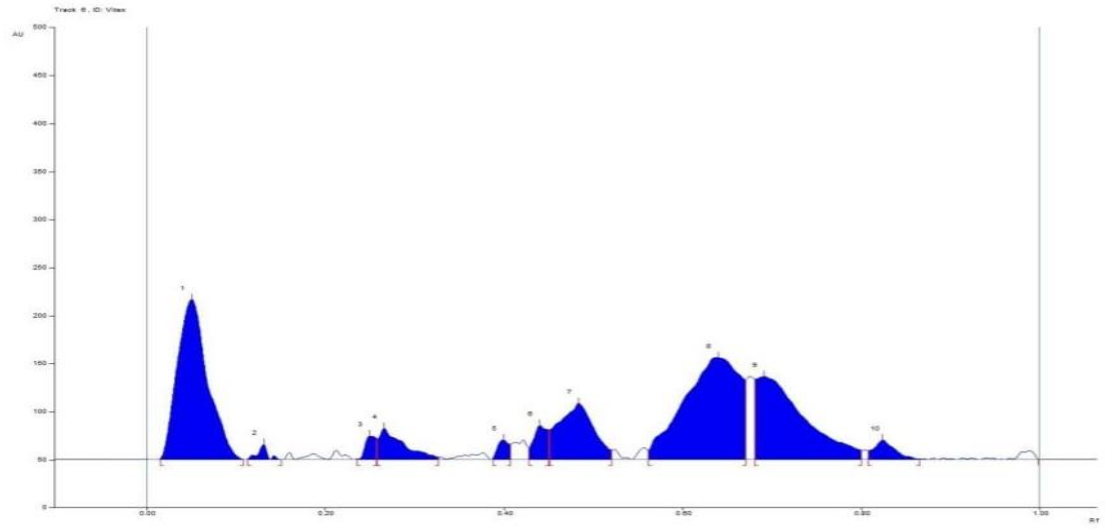
Other moderate peaks were observed at:

Rf 0.57 (5.21%), Rf 0.26 (3.36%), Rf 0.19 (3.86%), Rf 0.24 (3.23%), and Rf 0.48 (2.75%)

Minor peaks were seen at lower Rf values ranging from 0.04 to 0.17 and a minor peak at Rf 0.99.

This suggests that Parijata contains one major derivatizable compound along with several minor constituents.

HPTLC Profile of *Vitex negundo Linn aquious extract scanning at 520nm*



Track 6, ID: Vitex

Peak	Start Position	Start Height	Max Position	Max Height	Max %	End Position	End Height	Area	Area %
1	0.02 Rf	1.0 AU	0.05 Rf	166.8 AU	29.43 %	0.11 Rf	0.1 AU	5079.4 AU	25.91 %
2	0.11 Rf	0.1 AU	0.13 Rf	15.7 AU	2.78 %	0.15 Rf	0.0 AU	141.5 AU	0.72 %
3	0.24 Rf	0.5 AU	0.25 Rf	24.5 AU	4.33 %	0.26 Rf	22.0 AU	260.6 AU	1.33 %
4	0.26 Rf	21.3 AU	0.27 Rf	32.3 AU	5.71 %	0.33 Rf	2.2 AU	791.3 AU	4.04 %
5	0.39 Rf	1.2 AU	0.40 Rf	20.6 AU	3.63 %	0.41 Rf	16.1 AU	237.0 AU	1.21 %
6	0.43 Rf	12.3 AU	0.44 Rf	35.4 AU	6.24 %	0.45 Rf	31.1 AU	493.5 AU	2.52 %
7	0.45 Rf	31.1 AU	0.48 Rf	58.7 AU	10.36 %	0.52 Rf	9.8 AU	2020.9 AU	10.31 %
8	0.56 Rf	9.7 AU	0.64 Rf	106.0 AU	18.70 %	0.67 Rf	83.3 AU	5935.4 AU	30.28 %
9	0.68 Rf	83.9 AU	0.69 Rf	86.4 AU	15.25 %	0.80 Rf	9.6 AU	4219.4 AU	21.52 %
10	0.81 Rf	9.2 AU	0.82 Rf	20.3 AU	3.58 %	0.87 Rf	0.3 AU	425.1 AU	2.17 %

HPTLC Profile of Nirgundi (Vitex negundo Linn.) – Aqueous Extract (520 nm)

HPTLC fingerprinting of the aqueous extract of Nirgundi at 520 nm revealed 10 distinct peaks, indicating the presence of chromophoric compounds detectable after derivatization. The prominent peaks were observed at:

Rf 0.64 (30.28% area)

Rf 0.69 (21.52% area)

Rf 0.05 (25.91% area)

Rf 0.48 (10.31% area)

Moderate peaks were observed at Rf 0.27 (4.04%), Rf 0.44 (2.52%), and Rf 0.82 (2.17%), while minor peaks were present at Rf 0.13 and 0.25.

This indicates the presence of multiple derivatizable constituents with a few dominant compounds contributing to major peak areas.

DISCUSSION

The present study provides a comparative phytochemical and HPTLC-based evaluation of Parijata and Nirgundi, two classical Ayurvedic drugs indicated in Gridhrasi. Preliminary phytochemical screening revealed the presence of phenols, tannins, flavonoids, steroids and coumarins in both drugs, indicating a shared pharmacological base relevant to anti-inflammatory, analgesic and antioxidant activities. These phytoconstituents are known to modulate inflammatory mediators, reduce oxidative stress and provide neuroprotective effects, which are central to the pathophysiology of Gridhrasi where nerve root inflammation and irritation play a major role.

Distinct variations in phytochemical composition were observed between the two drugs. Parijata showed the presence of triterpenoids and anthraquinones, whereas Nirgundi exhibited sugars, quinones and saponins. Triterpenoids are reported to possess potent anti-inflammatory and tissue-protective actions, which may contribute to Parijata's efficacy in chronic inflammatory conditions. Anthraquinones may further support anti-inflammatory and analgesic responses. In contrast, the presence of saponins in Nirgundi may enhance bioavailability and facilitate better penetration of active principles, while quinones contribute to anti-inflammatory and antimicrobial effects. These differences may explain subtle variations in clinical response observed with the use of these drugs in musculoskeletal and neurological conditions.

HPTLC fingerprinting at 254 nm demonstrated a higher number of peaks in Parijata, suggesting greater chemical diversity, whereas Nirgundi exhibited fewer peaks with higher intensity, indicating the dominance of certain major constituents. This suggests that Parijata may exert a broader spectrum of pharmacological actions through multiple minor constituents, while Nirgundi may exert relatively stronger effects due to a few predominant bioactive compounds. At 520 nm, Parijata exhibited one highly dominant peak occupying a major proportion of the total area, suggesting the presence of a prominent derivatizable compound that may serve as a potential marker for standardization. Nirgundi, on the other hand, showed multiple prominent peaks, indicating a multi-component phytochemical profile contributing synergistically to its therapeutic activity.

The presence of overlapping Rf values in both drugs at both wavelengths suggests the occurrence of similar classes of phytoconstituents, supporting their common indication in Gridhrasi. The combination of shared phytochemicals and distinct marker compounds

highlights both the therapeutic similarity and chemical individuality of Parijata and Nirgundi. These findings also validate the traditional Ayurvedic concept of selecting drugs with Vatahara and Shoolahara properties while allowing scope for individualized drug selection based on clinical presentation.

Furthermore, the generated HPTLC fingerprints provide reliable reference profiles for authentication, quality control and standardization of raw drugs and formulations containing Parijata and Nirgundi. This is particularly relevant in the context of herbal drug adulteration and variability in phytochemical composition due to geographical and processing factors. The present study thus bridges classical Ayurvedic indications with modern analytical validation, strengthening the scientific basis for the use of these drugs in the management of Gridhrasi.

CONCLUSION

The present comparative study demonstrates that both Parijata (Nyctanthes arbor-tristis Linn.) and Nirgundi (Vitex negundo Linn.) possess a rich phytochemical profile supportive of their traditional use in the management of Gridhrasi (Sciatica). Preliminary phytochemical screening confirmed the presence of key bioactive groups such as phenols, flavonoids, tannins, steroids and coumarins in both drugs, which are relevant to anti-inflammatory, analgesic and antioxidant activities.

HPTLC fingerprinting at 254 nm and 520 nm revealed characteristic chromatographic patterns for both plants, indicating chemical complexity and the presence of distinct marker compounds. Parijata exhibited greater phytochemical diversity with multiple peaks and one dominant constituent at 520 nm, suggesting the presence of a prominent bioactive marker suitable for standardization. Nirgundi showed fewer but more intense peaks, indicating the predominance of certain active constituents that may contribute to its potent pharmacological action. The presence of overlapping Rf regions in both drugs supports their shared therapeutic indication in Gridhrasi, while the observed differences highlight their individual chemical identities. Nirgundi exhibited with higher intensity at both wavelengths, indicating richer phytochemical diversity. which may explain its slightly stronger Vedanahara and Shothahara activity compared to Parijata.

The generated HPTLC fingerprints can serve as reliable reference profiles for quality control, authentication and standardization of Parijata and Nirgundi in raw drug form and herbal formulations. The findings provide analytical validation to classical Ayurvedic usage and

form a scientific basis for further pharmacological and clinical studies to correlate these phytochemical signatures with therapeutic efficacy in Gridhrasi.

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