

# Analytical Evaluation of Chinch Twak & its Masi - A Skin Medicine of Folklore Practice

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## ABSTRACT

**Background:** Chinch twak masi (carbonized form of *Tamarindus indica* L.) is one of the popular folk remedy for skin manifestations used by familial practitioners at Haliyal region, Belagavi, Karnataka. This masi along with oils like coconut oil, groundnut oil, and castor oil is advised for external application in conditions like dry eczema, wounds, and other infectious skin lesions. Ayurveda has exclusive collection and documentations over Chinch (Tamarindus indica L.) and its therapeutic use. Tamarindus indica possess Madhura (sweet), amla (sour) rasa (taste), guru (heavy to digest), ruksha (dry) guna, ushna veerya (hot in potency) and amla vipaka (sour taste post metabolism) thus, indicated in vaatavyadhi (neuro - musculoskeletal disorders), agnimandhya (low digestive power), kamala (jaundice), shotha (swelling), khanda bhagna (fractures) and masurika (small pox). **Aims and Objectives:** present study was conducted to evaluate analytical parameters between Chinch twak (bark of *Tamarindus indica* L.) and its masi. **Materials and Methods:** Chinch twak collected from a mature, naturally grown *Tamarindus indica* tree and its masi was prepared according to the classical method and both were analysed for Physicochemical, phytochemical, FTIR and Chinch twak masi was analysed for inorganic traces and flamephotometry. **Results and Discussion:** on analysis both Chinch twak and its Masi were shown significant differences in preliminary phytochemicals, extractive values (Twak- WSE 12.442 %, ASE 8.295 % & Masi- WSE 4.015%, ASE 1.117%), functional groups (Twak- 30 groups & Masi- 11 groups), and inorganic contents (Ca- 10808 ppm, K- 202.8 ppm, Na- 422.4 ppm). **Conclusion:** these differences alter the pharmacological activities of Chinch twak when converted into masi. Thus utility of Chinch twak in both the forms possess different therapeutic potentials based on their chemical constituents.

**Keywords:** Folklore medicine, Chinch twak masi (carbonized form of *Tamarindus indica* L.), FTIR, Flamephotometry, Inorganic elements, Microbial limits

**How to cite this article:** Kakambi C, Hiremath R S, Motnalli R, Anil Kumar K M. Analytical Evaluation of Chinch Twak & its Masi - A Skin Medicine of Folklore Practice. Int J Drug Deliv Technol. 2026;16(37s): 711-718. DOI: 10.25258/ijddt.16.37s.91

**Source of support:** Nil.

**Conflict of interest:** None

## INTRODUCTION

Herbs play major role as food, medicine, shelter, etc., in human life. Since ancient history plants are the main source for treating various diseases of mankind. Folklore practitioners and other traditional healers are the first persons to recognize the importance of such herbal medicines. These practitioners treat on basis of knowledge, beliefs and technique transferred verbally by their ancestors from one generation to other. World health organization defines (2023) around 88 % world rural populations are entirely depended on these folklore practitioners and their plant

medicines<sup>1</sup>. Many studies on Indian tribal populations proved the potency of folklore practice in areas away from community healthcare systems. Their simple dosage forms like *kashaya* (liquid extracts), *kalka* (bolus), *bhasma* (ash), *masi* (carbonized medicine), of specific plant species for a particular disease have diverse pharmacological actions like anti-inflammatory, anti-oxidant, antimicrobial, rejuvenating and wound healing effects<sup>2</sup>.

*Chinch twak masi* (carbonized form of *Tamarindus indica* L.) is one among those popular folk remedy for skin manifestations used by

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familial practitioners at Haliyal region, Belagavi, Karnataka. This *masi* along with oils like coconut oil, groundnut oil, and castor oil is advised for external application in conditions like dry eczema, wounds, and other infectious skin lesions. Ayurveda an Indian traditional medicine has exclusive collection and documentations of *Chinchā* (bark of *Tamarindus indica L.*) on its therapeutic potential proven through various pharmacological experiments. It has *Madhura* (sweet), *amla rasa* (sour taste), *guru* (heavy to digest), *ruksha guna* (dry), *ushna veerya* (hot in potency), and *amla vipaka* (sour taste post metabolism) Thus, Therapeutically significant in *vaatavyadhi* (neuro – musculoskeletal diseases), *agnimandhya* (low digestive power), *kamala* (jaundice), *shotha* (swelling), *khandā bhagna* (fracture), and *masurika* (smallpox). Major chemical constituent of *chinchā twak* (bark of *Tamarindus indica L.*), *beeja* (seed) and *phala* (fruit) are hordenine, polysaccharide and epicatechin, and tamerindienol respectively<sup>3</sup>.

When compared to contemporary topical applications *chinchā twak masi* may show some potential advantages like cost effectiveness by local availability, low incidence of adverse effect, antibiotic resistance, and multiple pharmacological actions. Though the folklore medicines used widely in current rural practice, many of those formulations like *chinchā twak masi* are scientifically unexplored and lac in analytical validations. Absence in analytical validations limits these formulations for evidence based practice hence *chinchā twak* (bark of *Tamarindus indica L.*) and its *masi* were selected for analysing physicochemical, phytochemical, flame-photometry, Fourier Transform Infrared Spectroscopy – FTIR and others to evaluate their identity, quality, safety and purity.

### MATERIALS AND METHODS

#### Pharmaceutical study:

**Preparation of *Chinchā twak yavakutta churna* (cores powder):** *Chinchā twak* (bark of *Tamarindus indica L.*) was collected from a completely mature tree grown in Belagavi. Collected *twak* was dried under sun with all aseptic measures. Dried *twak* (bark) was taken in a clean medium size stone *khalwa yantra* (mortar) and made into *yavakutta churna*<sup>4</sup> (Figs. 1 and 2).

**Preparation of *Chinchā twak masi*:** from prepared *yavakutta churna*, 100 gm was taken in a clean medium size *mruttika sharava* (earthen plate)

and placed over *madhyamagni* (mild heat 250-350 °C). Heat was given until the appearance of jet-black colour and absence of fumes<sup>5</sup> (Fig.3) and at the end around 42 gm of *masi* was obtained (Fig. 4).



Fig. 1 dried *chinchā twak*



Fig. 2 heating of *twak churna*



Fig. 3 *krushnata* and *nirdhumata*



**Fig. 4 chinchwa twak masi**

**Analytical study:**

The authentication and microbial limit tests of *chinchwa twak* (bark of *Tamarindus indica L.*) physicochemical, phytochemical testing of both *twak* and *masi* were conducted according to the API standards<sup>6</sup>. Inorganic element test of *Chinchwa twak masi* was conducted as per the standard guidelines<sup>7</sup>. Study was carried out at AYUSH approved Drug testing laboratory KAHER's Shri B M Kankanawadi Ayurveda Mahavidhyalaya Shahapur, Belagavi-03.

**Flamephotometry study** - 2 gms of *Chinchwa twak masi* was taken, and ash was prepared out of it. This ash was made to dissolve in 25 ml of dil.HCl, and it was then filtered. This filtrate was subjected to a flame photometer. Study was carried out at AYUSH approved Drug testing laboratory KAHER's Shri B M Kankanawadi Ayurveda Mahavidhyalaya Shahapur, Belagavi-03.

**FTIR analysis** - a small quantity of *Chinchwa twak churna* was placed over the ATR crystal surface, and the sample was subjected to analysis in the Buker Alpha II FTIR spectrometer. Similarly the *chinchwa twak masi* was also analysed for FTIR at Sant Dyaneshawar Shikshan Sanstha's Annasaheb Dange College of B. Pharmacy, Ashta, Sangli, Maharashtra - 416301

**RESULTS**

**Table I Physicochemical results of *chinchwa twak*:**

Tests	Results
<b>Macroscopic Description</b>	
Part	Bark
Colour	Reddish brown to dark brown
Taste	Astringent
Odour	Slightly Aromatic
<b>Physicochemical results</b>	
Foreign Matter	Nil
Ash Value	8.381 %

Acid insoluble Ash	1.466 %
Water soluble extractive	12.442 %
Alcohol soluble extractive	8.295 %

**Table II Test for specified Micro-Organisms limit of *chinchwa twak*:**

<b>Qualitative</b>		
Micro-organisms	Limits	Results
E coli	Absent/100 ml	Absent
S aureus	Absent/100 ml	Absent
P aeruginosa	Absent/100 ml	Absent
S abony	Absent/100 ml	Absent
<b>Quantitative</b>		
Total Bacterial Count	30-300 cfu/ml	25 cfu/ml
Total Fungal Count	10-100 cfu/ml	10 cfu/ml

**Table III Physicochemical results of *chinchwa twak masi*:**

Tests	Results
<b>Macroscopic Description</b>	
Form	Powder
Colour	Blakish
Odour	Burnt
<b>Physicochemical results</b>	
Loss on drying	0.289%
Ash value	41.250%
Acid insoluble ash	9.850%
Water soluble ash	3.775%
Water soluble extractive	4.015%
Alcohol soluble extractive	1.117%
pH	5.83

**Table IV Preliminary phytochemical screening of *chinchwa twak* and its *masi* extracts:**

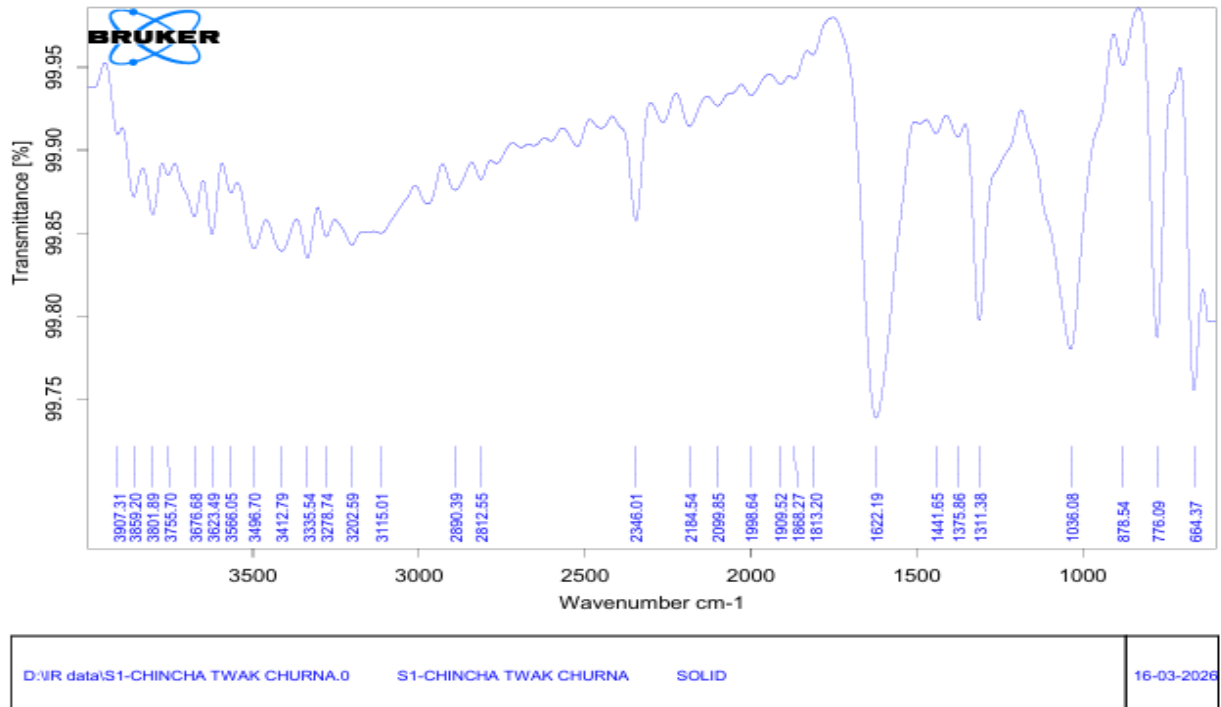
Phytochemicals	<i>Twak</i> WE	<i>Twak</i> AE	<i>Masi</i> HCl Extract
Carbohydrates	Positive	Positive	Negative
Reducing sugars	Negative	Positive	Positive
Steroids	Negative	Positive	Negative
Flavonoids	Positive	Positive	Negative
Alkaloids	Negative	Positive	Negative
Cardiac glycosides	Positive	Positive	Negative

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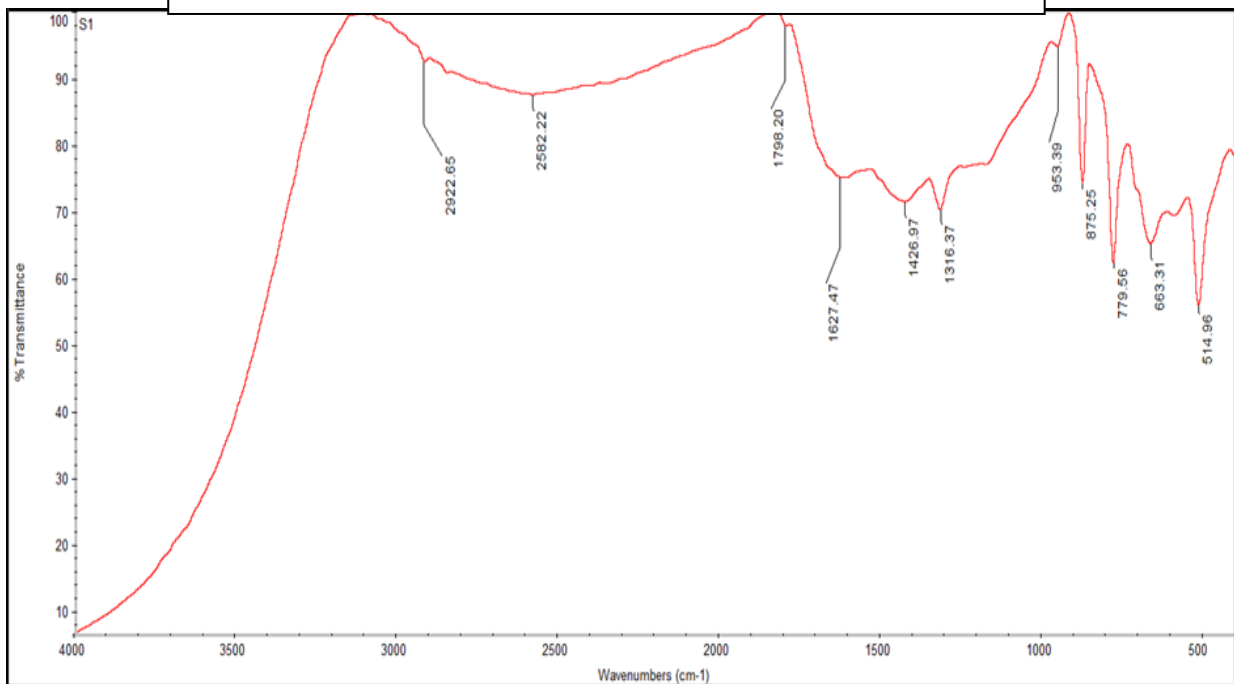
Note: *Twak WE* – chincha twak water extract, *Twak AE* - chincha twak alcoholic extract, *Masi HCl Extract* - chincha twak masi HCl extract  
 Table V inorganic element analysis and flame-photometry results of *chincha twak masi*:

Tests	Results
<b>Inorganic elements analysis</b>	
Calcium	Positive
Magnesium	Positive

Sodium	Negative
Potassium	Negative
Iron	Positive
Sulphate	Positive
<b>Flame-photometry</b>	
Calcium (Ca)	10808 ppm
Potassium (K)	202.8 ppm
Sodium (Na)	422.4 ppm



**Fig. 5 FTIR graph of chincha twak masi**



**Fig. 6 FTIR graph of chincha twak**

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**Table VI FTIR results of *chinchwa twak*:**

Sr. no.	Wavenumber (cm <sup>-1</sup> )	Peak intensity	Stretching vibration	Probable functional group	Reference value (cm <sup>-1</sup> )
1	3907.31	Weak	O–H free stretching	Free alcohol / hydroxyl group	3600–4000
2	3859.20	Weak	O–H free stretching	Alcohol / phenol	3600–4000
3	3801.89	Weak	O–H stretching	Hydroxyl group	3600–4000
4	3755.70	Weak	O–H stretching	Alcohol	3600–4000
5	3676.68	Medium	O–H stretching	Alcohol / phenol	3200–3600
6	3623.49	Medium	O–H stretching	Hydroxyl group	3200–3600
7	3566.05	Medium	O–H stretching	Alcohol	3200–3600
8	3496.70	Broad	O–H stretching	Alcohol / phenol	3200–3600
9	3412.79	Broad	O–H stretching	Hydrogen-bonded alcohol	3200–3600
10	3335.54	Medium	N–H stretching	Amine / amide	3300–3500
11	3278.74	Medium	N–H stretching	Primary/secondary amine	3300–3500
12	3202.59	Weak	N–H stretching	Amine	3300–3500
13	3115.01	Weak	=C–H stretching	Aromatic / alkene	3000–3100
14	2890.39	Medium	C–H stretching	Alkane	2850–2960
15	2812.55	Weak	C–H stretching	Aldehyde C–H	2700–2900
16	2346.01	Weak	O=C=O stretching	Carbon dioxide	~2350
17	2184.54	Weak	C≡C stretching	Alkyne	2100–2260
18	2099.85	Weak	C≡C stretching	Alkyne	2100–2260
19	1998.64	Weak	Overtone/combination	Aromatic system	2000–1660
20	1909.52	Weak	Overtone band	Aromatic	2000–1660
21	1868.27	Weak	C=O stretching	Acid anhydride	1800–1850
22	1813.20	Medium	C=O stretching	Anhydride / ester	1750–1820
23	1622.19	Medium	C=C stretching	Aromatic ring	1500–1650
24	1441.65	Medium	C–H bending	Alkane	1350–1470
25	1375.86	Medium	C–H bending	Methyl group	1350–1385
26	1311.38	Medium	C–N / C–O stretching	Amine / alcohol	1020–1350
27	1036.08	Strong	C–O stretching	Alcohol / ether	1000–1300
28	878.54	Weak	=C–H bending	Aromatic	690–900
29	776.09	Weak	C–H bending	Aromatic	690–900
30	664.37	Weak	C–Cl stretching	Alkyl halide	600–800

**Table VII FTIR results of *Chinchwa twak masi*:**

Sr. no	Wavenumber cm <sup>-1</sup>	Peak intensity	Stretching vibration	Probable functional group	Reference value					Aliphatic	
1	2922.65	weak	C-H	Aromatic or	3100-2900						
2	2582.22	Medium								Carboxylic acid	3200-2400
3	1798.20	weak								Amide	1800-1700
4	1627.47	Strong								Aromatic	1700-1600

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5	1426.97	weak	C=C	Aromatic	1600-1400
6	1316.37	weak	C-H	Aromatic	1400-1200
7	963.39	weak	C-H	Aromatic	900-600
8	875.25	Strong	C-H	Aromatic	900-600
9	779.56	Strong	C-Cl	Alkyl or aryl chloride	800-600
10	663.31	Medium	C-X	Halide	800-600
11	514.96	Medium	C-Br	Bromide	600-500

### DISCUSSION

*Chincha (Tamarindus indica)* is an evergreen large tree growing around 24 m height with alternate leaves, pale pinkish or pale yellowish flowers, 4 cm long subcylindrical fruits with pod and 1.6 cm long, hard and shiny seeds. Bark is having active components like tannins, flavonoids, succinic acid, gum, tartaric acid, sugar, glycosides, alkaloids, pectin and sesquiterpenes. This bark in different traditional dosage forms was used widely by many folklore practitioners to treat diarrhea, dysentery and abdominal pain of affected persons in India and other tropical countries<sup>8</sup>. Here one of a famous traditional healer converted *chincha twak* into *masi* and mixed it along with groundnut oil and used to overcome many dermatological manifestations.

Physicochemical parameters are used to test quality control and purity evaluation of herbal medicines. Many research works proved that, they are the key investigators for stability and mineral compositions of herbal medicines<sup>9</sup>. In current study *chincha twak* and its *masi* were detected with no foreign matter indicating absence of contaminants. Total ash of *twak* (8.381 %) was comparatively lower than *masi* (41.250 %), indicating presence of many bioactive components after first burning, while total ash value of *masi* indicates complete combustion of those bioactive components and rise in inorganic plant minerals after second burning. Rise in acid insoluble ash from 1.466 % of *twak* to 9.850 % of *masi* may signify higher concentration of plant minerals found after combustion. Higher water and alcohol soluble extractive values of *twak* that is 12.442 % and 8.295 % respectively may denote the presence

of phytochemicals like glycosides, tannins, phenolic compounds and other semi-polar and polar components in *twak*<sup>10</sup>. Whereas lower extractive values (water – 4.015 % and alcohol – 1.117 %) found in *masi* may be due to loss of phytochemicals during indirect combustion or partial solubility of *masi* in water, alcohol and other organic solvents. *Masi* has LOD of 0.289 % indicating low moisture content and slightly acidic pH 5.83 which were contributed either by the inorganic salts and organic residues formed during the process or by the organic acids and acidic polysaccharides found naturally in the *chincha twak*<sup>11</sup>.

In preliminary phytochemical tests carbohydrates, flavonoids and cardiac glycosides were found in both the extracts (aqueous and alcoholic) of *chincha twak* which primarily contribute for antioxidant, anti-inflammatory, antimicrobial and wound healing potential of the bark<sup>12</sup>. Whereas other phytochemicals like steroids, reducing sugars and alkaloids were found only in alcoholic extracts of the *twak*. This may be due to the better solubility of these substances in organic solvents like ethanol and these constituents also contribute for analgesic, anti-inflammatory and antimicrobial effects of the bark<sup>13</sup>.

Similarly the *chincha twak masi* was also tested for preliminary phytochemicals by preparing aqueous (1P *masi* + 6P Distilled water – Hot maceration method) and alcoholic (1P *masi* + 6P ethanol – Soxhlet extraction method) extracts but the results found were not satisfactory. Since the *masi* is insoluble in water, partially soluble in alcohol and other organic solvents we have tested it again with the HCl extract (2 gm *masi* + 25 ml dil.HCl). Under this trial only reducing sugar was found positive. This positive result signifies that reducing sugars form a simple carbonyl compounds while preparation of *masi* which were get hydrolyzed, released and detected further by the action of dil. HCl while testing<sup>14</sup>. It was also noted that even after different extraction techniques were used to test preliminary phytochemicals of the *masi* many phytochemicals found undetected. It is either due to thermal degradation, oxidation and structural breakdown of many thermo labile constituents like phenolic compounds, flavonoids, and others, which were reduced to undetectable levels during the procedure<sup>15</sup> or due to lack of ability to detect bioactive components by simple techniques of preliminary phytochemical testing methods which

majorly relays on visual results like colour change, precipitation formations, etc., Thus for further evaluation both *chinchwa twak churna* and its *masi* were tested under FTIR.

When *chinchwa twak masi* is tested for inorganic elements and flame-photometry calcium is detected in higher concentration 10808 ppm. It denotes during the process of *masi* preparation many phytochemicals and other organic materials undergo thermal degradation and get concentrated into calcium rich bioactive component. These levels of calcium in the *masi* play significant role in eczema by epidermal differentiation and skin regeneration<sup>16</sup>. Other elements like iron, magnesium sulphates which were detected under qualitative elemental analysis may actively contributes for pharmacological activities of *masi* like anti-seborrheic activity, collagen production and epidermal hydration<sup>17, 18</sup>. Sodium and potassium were not detected under qualitative elemental test due to their vary low concentrations 422.4 ppm sodium and 202.8 ppm potassium which were quantified by flame- photometry in further. These elements balance electrolyte levels of skin along with all inorganic traces and other organic bioactive components<sup>19</sup>.

The FTIR findings of *Chinchwa twak* confirmed the presence of multiple components belonging to aromatic, aliphatic, hydroxyl, amine, carbonyl and other functional groups at 30 different peaks. 9 different O-H stretches were detected between 3412.79 cm<sup>-1</sup> to 3907.31 cm<sup>-1</sup> indicates the presence of phenols or alcoholic groups like polyphenols and tannins. The N-H stretches of ammine groups from peak 3202.59 cm<sup>-1</sup> to 3335.54 cm<sup>-1</sup> showed the presence of alkaloids and other proteins. Many C-H stretches found at variable peaks like 2890.39 cm<sup>-1</sup>, 2812.55 cm<sup>-1</sup>, 1441.65 cm<sup>-1</sup>, and 1375.86 cm<sup>-1</sup> denote aliphatic compounds like hydrocarbon chains of possible lipids. C=O stretching carbonyl groups like esters were also detected at peaks 1813.20 cm<sup>-1</sup> and 1868.27 cm<sup>-1</sup>. It also confirmed the presence of many aromatic compounds, alcohols, hydrocarbons, esters, ethers, and glycosides by detecting absorption bands of C=C, =C-H, C-N, and C-O stretching's at variable peaks. Also the inorganic elements in trace level were detected at a weak peak 664.37 cm<sup>-1</sup>. While coming to *Chinchwa twak masi*, FTIR findings showed significant reduction in the functional groups of its bark. On analysis rapid reduction in Hydroxyl group (O-H) was noted, it indicates loss

of thermolabile constituents like carbohydrates, glycosides, and other phenolic compounds. Along with this, the degradation of nitrogen compounds (N-H) like alkaloids and proteins, were also appreciated by absence of N-H stretches in the *masi* analysis. Detection of C-H, C-C, and C=C aromatic functional groups at peaks 2922.65 cm<sup>-1</sup>, 1627.47 cm<sup>-1</sup>, 1426.97 cm<sup>-1</sup>, 1316.37 cm<sup>-1</sup>, 963.39 cm<sup>-1</sup>, and 875.25 cm<sup>-1</sup> in the *Chinchwa twak masi* signifies the conversion of aromatic carbon components into a stable, conjugated carbon residue during the process of *masi kalpana*. Presence of new peaks between the range 514.96 cm<sup>-1</sup> to 779.56 cm<sup>-1</sup> signified the mineral or other inorganic enrichments like calcium, potassium, sodium, magnesium and sulphates in the *Chinchwa twak masi* which was boosted by the flame photometry and inorganic findings discussed previously.

### CONCLUSION:

Current study gives a comparative evaluation of Preliminary phytochemical, physicochemical, FTIR properties, inorganic and flamephotometry assessment of *Chinchwa twak* and its *masi*. On comparison the findings were clearly denoted that during the *Chinchwa masi* preparation many organic bioactive components were transformed into inorganic, mineral rich residue with stable carbonised bioactive components. This conversion alters the pharmacological activities of *Chinchwa twak* when converted into *masi*. Thus utility of *chinchwa twak* in both the forms possess different therapeutic potentials based on their chemical constituents.

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