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Review Article

Phytoconstituent comparison and standardisation of three distinct commercially available ayurvedic formulations using Yastimadhu Churna extract

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Abstract

The 'Leguminosae' family, including Yashtimadhu (*Glycyrrhiza glabra* Linn.), is called Mulhatti, Sweet Wood, Licorice, and Liquorice. Many traditional formulas contain Glycyrrhiza glabra, a popular classical medicinal herb. Glycyrrhiza Glabra root treats ulcers, eye problems, bronchitis, asthma, abdominal colic, and thirst. Charak and Bhav Prakash claim that Madhura, Guna-Guru & Snigdha, Virya-Sheet, and Vipaka-Madhura are members of Yashtimadhu Rasa. It performs several Karmas as a result of this virtue, including Shothhar, Vishghana, Chhardighana, Pipasahar, Kshayahar, Varnya, Keshya, Vatapittajit, Shukrajanan, Balya, Chakshushya, and 1 Glanihar. Numerous pharmacological effects, including healing, anti-ulcer, anti-inflammatory, skin-regeneration, anti-bacterial, anti-fungal, anti-hemorrhoidal, anti-haemostatic, and antimalarial properties, have also been demonstrated by contemporary research. Antioxidant and immunostimulatory properties.

Keywords: Glycyrrhiza glabra, Tapped Density, Bulk density, Angle of repose, Chromatography

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1. Introduction

Since the earliest days of human agriculture, plants have been vital suppliers of medicinal substances, a testament to the wisdom of our ancestors. This historical significance of herbal remedies connects us to our past and the enduring value of natural solutions. Today, the market for pharmaceuticals, food supplements, health products, and plant-based medications is expanding, reflecting a growing interest in these time-tested remedies. These plants have therapeutic significance because they contain certain chemicals that have specific physiological effects on people. Triterpenoids, saponins, flavonoids, tannins, alkaloids, and phenolic chemicals are the most significant plant bioactive components.

The word "glycyrrhiza" comes from the ancient Greek words "glykos," which means "sweet," and "rhiza,"[1,2] which means "root." In North India, mulethi is the name given to Glycyrrhiza glabra (Yashtimadhu). Glycyrrhiza glabra, commonly referred to as sweet wood and liquorice, is indigenous to parts of Asia and the Mediterranean. This ayurvedic remedy treats coughs, throat pain, and respiratory disorders. Additionally, it supports and shields the liver.

Often used to treat hyperacidity and peptic ulcers, this potent antioxidant has a soothing effect.

2. Research Objective

Our primary goal is to comprehensively contrast the standardisation analysis of three commercially available Yashtimadhu Churna Ayurvedic formulations. This research objective is of utmost importance as it significantly contributes to establishing quality benchmarks for herbal formulations, thereby enhancing the safety and efficacy of Ayurvedic medicines.

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1. Dabur
2. Patanjali
3. Vyas
4. Crude drug

Standardising herbal formulation is a meticulous process crucial to evaluating the quality of medications using physical, chemical, and phytochemical characteristics. This rigorous standardisation process ensures the reliability and consistency of the research findings.

3. Plan of Work

Our research methodology involves a comprehensive literature survey, careful drug selection, and the extraction of all marketed formulations and crude drugs. We then compare the Phyto-constituents of different form extracts of Yastimadhu Churna using a series of tests, ensuring a thorough and reliable analysis of the formulations.[3,4]

1. Phytochemical test
2. Thin Layer Chromatography
3. Pharmacognostic Study
4. Determination of Extractive value
5. Bulk Density C Tapped density
6. Carr's Index, Hausner's Ratio, Angle of Repose
7. Determination of Ash Value C Moisture Content

4. Review Literature

1. Vaishali Kute and associates (2017)[5] Numerous physical, chemical, and biological aspects were examined for quantitative and qualitative examination of a few chosen formulations for the in-house and two commercial versions of Hingwashtak churn, and the results were encouraging.
2. Prince et al., Pal Kumar (2021)[6] This study helped create the Yastimadhu Churna standardisation standard and confirmed the formulation's anti-inflammatory properties.
3. Sangeeta Mukhi et al. (2015)[7,9] outlined the necessity of documenting the characteristics of Samasharkara Churna to preserve its uniqueness, quality, and purity.
4. Shipra and associates (2021)[8] The research report on standardising the churn of anxiolytic formulations made from polyherbal ingredients. Furthermore, the developed formulation was contrasted with the commercially available sample, and after standardisation,

5. Materials and Methods

5.1. Materials

5.1.1. Plant materials

Glycyrrhiza glabra Linn (yastimadhuor mulethi[10,11]

5.1.2. Preparation of extract:[12,13]

1. Collected plant root of Yashtimadhu washed thoroughly, shade dried & powdered.
2. 5gm of sample + 50ml ethanol + 5ml water in round bottom flask + heat 30 mins
3. Hydroalcoholic extract prepared.
4. Filtered while hot, macerated for 24 hours in a closed flask
5. Stored in sterile bottles & kept in the refrigerator

5.2. Chemical method

5.2.1. Preliminary phytochemical study[14,15](***Table 1***, ***Table 2***)

Table 1: Marketed formulation of Yastimadhu Churna

Product (Ingredients)	Location	Chemicals	Instruments
Formulation-1: In-house formulation	Local Market	Ethanol, Hexane, Ethyl acetate, Iodine, Phloroglucinol, HCL, Mayer's reagent, Dragendroff's reagent, Fehling's solution A and B, conc. Nitric acid, Ferric chloride, Lead Acetate, Chloroform, Sulphuric acid	TLC UV Cabinet, Muffle furnace, Bulk density apparatus, Heating mantle, Hot air oven, Digital balance, Desiccator, Binocular Microscope
Formulation- 2: Dabur	Local Market		
Formulation-3: Patanjali	Local Market		
Formulation- 4: Vyas	Local Market		

Table 2: Preliminary Phytochemical test

Test	Procedure	Observations
Test for Alkaloids: Mayer's test	2ml test solution + 2ml Mayer's reagent	Precipitate forming a pale-yellow colour
Test for Saponin	Test sample + vigorously shaken with water	Formation of consistent, recognisable froth for 10 mins
Test for glycosides: Fehling's test	1ml each of Fehling's solution A & B + 2ml test solution + boil in water bath for 5-10 mins	Formation of reddish-brown precipitate
Test for Phenol: Ferric chloride test	Extract + 3-4 drops of 5% ferric chloride solution	Formation of bluish-black colour
Test for Flavonoid: Lead Acetate test	1ml extract + a few drops of 10% lead acetate solution	Formation of yellow precipitate
Test for Steroid: Salkoweski's test	2ml chloroform + few ml of extract + 2ml conc. H_2SO_4	Emergence of copper red in chloroform layer

5.2.2. Thin layer chromatography[16,17]

TLC was developed using precoated silica gel plates. All four samples were applied using capillary starting from the plate edges using mobile phase hexane: ethyl acetate (5:5). The plates are developed by ascending technique in a glass chamber (temperature-25degree Celsius and humidity- 50-60%) chamber get saturated by solvent system vapours after 20 min. Plates were developed, dried, and examined under the UV cabinet, and the Rf value was calculated.

TLC fingerprint profile: TLC Fingerprint Profile: All gathered formulations were put through TLC fingerprint profiling to assess the differences in chemical contents present since the study's main goal was to distinguish formulations from their adulterants using physical, chemical, and biological methods. All formulations extract fraction was spotted on the TLC plate and developed in Hexane: ethyl acetate (5:5). The plate was observed under 254nm as given in the table (Rf values of formulations).**Table 3**

Table 3: Rf value of Formulation

Spot on	Formulation-1	Formulation-2	Formulation-3
1	0.36	0.36	0.18
2	0.54	0.25	0.36
3	0.72	0.54	0.54
4	-	0.65	0.72

5.2.3. Pharmacognostical study:[18,19]

Microscopic study of Yastimadhu Churna

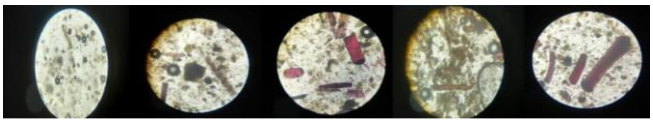

Figure 1: *Crude (Formulation –1):* **A:** Fibre; **B:** Parenchyma cells; **C:** Tannins; **D:** Oil globules; **E:** Tracheids with spiral thickenings

Figure 2: *Dabur (Formulation-2); **A:*** Fibre; **B:** Parenchyma cells; **C:** Tannins; **D:** Lignified border of pitted vessel; **E:** Vessels of vascular strands

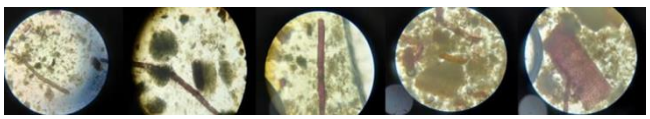

Figure 3: *Patanjali (Formulation-3);* **A:** Fibre; **B:** Parenchyma cells; **C:** Tannins; **D:** Oil globules; **E:** Tracheids with spiral thickenings

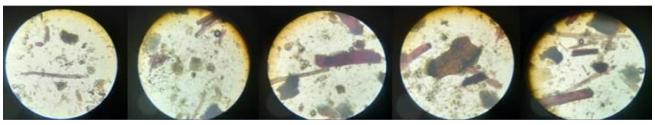

Figure 4: *Vyas (Formulation-4);* **A:** Fibre; **B:** Parenchyma cells; **C:** Tannins; **D:** Lignified border of pitted vessel; **E:** Pollen grain

5.2.4. Extractive values:[20]

1. Water soluble extractive value- 5gm powder+100 ml water+shook 6 hrs +After 18 hrs filtered, 25ml filtrate evaporated to dryness+Dried residue at 105ºC
2. Alcohol soluble extractive value- 5gm powder+100ml ethyl alcohol+shook 6 hrs+After 18 hrs filtered, 25 ml filtrate evaporated to dryness+Dried residue at 105ºC

5.2.5. Bulk density and Tapped density:[21]

1. 25gm powder poured graduated measuring cylinder + weigh cylinder with sample Bulk
2. Density = Mass/Bulk volume
3. 100 tapping + weigh the cylinder with sample Tapped density= Mass/Bulk volume
4. Carr's index = [Tapped Density-Bulk density] / [Tapped density] ×100
5. Hausner's ratio =Tapped density/Bulk density

5.2.6. Ash value:[22,23,24]

1. Total ash value- silica crucible + ignited (2 hrs at 100ºC) + put in desiccator (15mins) + weigh empty silica crucible + added 2gm sample + put into muffle furnace (4500 C- 6000 C) + remove from muffle furnace & put into desiccator + weighed & calculate Total ash= weight of ash with silica crucible-weight of empty silica crucible
2. Acid insoluble ash value- Total ash + 25ml of 2N of HCl+5mins boil + filtered + poured 5ml hot water + put filter paper in crucible & ignited to the muffle furnace + put into desiccator (30mins) +weighed
3. Acid insoluble ash= weight of acid insoluble ash with crucible- weight crucible
4. Water soluble ash value-Ash+25ml water+insoluble material cleaned with hot water+burned for 15mins
5. Water soluble ash= weight of water-soluble ash with crucible-weight of crucible

5.2.7. Moisture content:[23,25]

Dry spotless china dish (105ºC, 30mins) +1gm powder + dried at 105ºC put in the desiccator. We weighed in every 30mins+repeated till constant weight didn't come.

% moisture content = (Change in weight×100)/Weight of powder sample

6. Result and Discussion

6.1. Extractive values

Extractive values indicate the active components present in the plant material. Water-soluble and alcohol-soluble extractive is used as a means of evaluating crude drugs. Relatively high values of water-soluble and alcohol-soluble extractions confirm the presence of higher amounts of the active principles in the formulation. **Table 4**

6.2. Ash values

The total ash content represents inorganic salts naturally occurring in raw materials or added as adulterants. This parameter serves to detect contamination and adulteration by sand or earth. The low ash contents of Yashtimadhu Churna indicated the purity of the formulation. **Table 5**

6.3. Bulk and tapped density

Bulk Density is typically lower than tapped density and reflects the initial, loose packing of the powder after pouring or minimal handling. The value depends on the powder's particle size distribution, shape, and surface properties. Tapped density is a higher value obtained after mechanically tapping the powder container. The tapping process rearranges the particles, reducing the air voids between them, leading to a denser packing. Results are shown in the following table.

6.4. The angle of repose

The fixed funnel method was used to estimate the angle of repose. The angle of repose was found to be in different ranges for different formulations. Results are shown in the following table.

6.5. Carr's index and Hausner's ratio

Bulk and tapped density were used to generate Carr's index and Hausner's ratio. Among all four formulations, the flowability of Patanjali was very, very poor. Results are shown in the following table. **Table 6**

6.6. Moisture content

Moisture content was found to be very low. The amount of water in a powder sample is expressed as a percentage of the powder's weight. It can be measured by drying a sample in an oven and comparing the weight before and after drying.**Table 7**

Table 4: Extractive value

Formulation	Water soluble extractive value(%w/w)	Alcohol soluble extractive value (%w/w)
Crude	11.2	10.4
Dabur	8.8	8
Patanjali	13.6	12
Vyas	8	7.2

Table 5: Ash value

Formulation	Total ash (%)	Acid-insoluble ash	Water soluble ash
Crude	5	0	5
Dabur	7	1	13
Patanjali	6	0	6
Vyas	6	1	5

Table 6: Bulk density, Tapped density, Carrs Index, Hausner Ratio & Angle of repose

Formulation	Bulk density	Tapped density	Carr's index (%)	Hausner's ratio	Angle of repose
Crude	0.5	0.76	34.21	1.52	41.34
Dabur	0.4	0.66	39.43	1.65	36.86
Patanjali	0.43	0.76	50	1.76	44.42
Vyas	0.43	0.71	39.43	1.65	41.66

Table 7: Moisture content

Formulations	Moisture content (%)
Crude	5
Dabur	3
Patanjali	4
Vyas	4

7. Conclusion

Morphology, microscopy, phytochemical, physical, and pharmacognostic analyses are used to assess the collected plant materials. All plant materials were determined to be accurate by comparing them to existing literature. Every formulation of Yastimadhu Churna was determined to have the aforementioned class of components in the chemical examination. According to TLC reports, every chemical found in formulations 1, 2, 3, and 4 that were found in-house was present. During the physical assessment and standardisation of commercial formulations, it was discovered's ash value of Yastimadhu churn was within acceptable bounds. The amount of moisture is within acceptable bounds. The likelihood of microbial assault and constituent hydrolysis is relatively low. The current study's findings will also be used as a reference manual for creating medication formulations.

8. Source of Funding

None.

9. Conflict of Interest

None.

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