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Review Article

Herbal Acidity Relief: Developing A Woodapple Chyawanprash

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ABSTRACT

Wood apple chyawanprash is a modified herbal formulation developed by combining the traditional Ayurvedic Rasayana concept of Chyawanprash with the nutritional and medicinal properties of wood apple. Classical Chyawanprash is described in the literature as a polyherbal preparation that supports vitality immunity, digestion, strength, and healthy aging, while wood apple is reported to contain bioactive compounds such as phenolics, flavonoids, fiber, vitamins, and minerals that may contribute antioxidant and functional benefits [1][2][3][4]. Because of this combination, wood apple chyawanprash is being explored as a functional herbal product with potential applications in preventive health and nutrition [3][4].

INTRODUCTION

Chyawanprash is one of the most recognized Ayurvedic formulations and has been used traditionally as a rejuvenating tonic. In classical practice, it is prepared as a semisolid herbal jam with amla as the chief ingredient, along with many other herbs, ghee, sugar, and aromatic substances [1][2]. It is classified under Rasayana formulations, which are intended to promote longevity, strengthen body tissues, and improve resistance to disease [1]. The importance of Chyawanprash in Ayurveda comes from its holistic role rather than the effect of a single herb. Traditional and review-based literature describes it as a formulation that

may support immunity, respiratory health, digestion, and general well-being [2][1]. This has made Chyawanprash popular not only as a traditional medicine but also as a health supplement in modern households [5][6]

Wood apple, scientifically known as *Feronia limonia* or *Limonia acidissima*, is an underutilized tropical fruit with growing scientific interest [7][4]. It is valued for its edible pulp, distinct flavor, and nutrient content, including carbohydrates, dietary fiber, minerals, and phytochemicals [7][3]. Review articles report that wood apple possesses antioxidant, antimicrobial, antidiabetic, hepatoprotective, and gastroprotective potential,

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making it attractive for functional food and pharmaceutical applications [3][4]. The rationale for developing wood apple chyawanprash is based on combining two complementary ideas. First, Chyawanprash provides a traditional herbal base already accepted for health promotion. Second, wood apple may add natural fruit bioactives, improved sensory quality, and nutritional diversity [3][4][7]. Such a formulation could be positioned as a modernized Ayurvedic spread or nutraceutical suitable for broader consumer acceptance.

Another reason for interest in this formulation is the increasing demand for natural, plant-based wellness products. Consumers today often prefer foods that provide health benefits beyond basic nutrition, and herbal jams or spreads fit well into that trend [4][5]. A wood apple chyawanprash could therefore serve as a bridge between classical Ayurveda and contemporary functional food development [3][7]. However, despite this promise, direct scientific literature on wood apple chyawanprash remains limited. Most available evidence comes from two separate bodies of literature: studies on Chyawanprash in general and studies on wood apple as a fruit or medicinal plant [2][3][4]. For this reason, any academic paper on the topic should clearly explain the evidence gap and avoid overstating claims.

REVIEW OF LITERATURE:

Traditional literature on Chyawanprash presents it as a multifaceted formulation with rejuvenating and health-promoting properties. A classical review notes that Chyawanprash is prepared from a large number of herbal ingredients, and its long-standing use in Ayurveda reflects its role as a Rasayana formulation [1]. The formulation is traditionally believed to support strength, immunity, digestion, and resilience, which is why it remains relevant even in modern times [1][2]. Modern review articles also discuss

Chyawanprash in terms of pharmacological potential. The article reviewing therapeutic benefits explains that the formulation has been associated with antioxidant and immunomodulatory effects, though the strength of evidence varies depending on the specific study design [2]. These reviews often highlight that the benefits are likely due to the synergistic action of many ingredients rather than one component alone [2][1]. This is important when considering a new variant such as wood apple chyawanprash, because the base formulation already has a strong traditional framework.

Wood apple literature adds another layer to the review. One review on wood apple notes that the fruit has a rich phytochemical profile and has been studied for multiple biological activities, including antioxidant and antimicrobial effects [3]. Another source emphasizes that wood apple is nutritionally valuable and underutilized, making it a good candidate for product development [7]. A systematic review on processing and health benefits further supports the idea that wood apple deserves more attention in food and pharmaceutical research [4]. The relevance of wood apple to Chyawanprash lies in its potential to enhance the formulation nutritionally and functionally. Fruit pulps are often used in traditional and modern formulations because they provide natural sugars, flavor, texture, and bioactive compounds [7][4]. If incorporated properly, wood apple may improve the palatability of Chyawanprash while also contributing fiber and phytochemicals that support antioxidant activity [3][7].

From a formulation science perspective, a wood apple-based Chyawanprash would need careful balance. Too much pulp could affect shelf life, texture, or microbial stability, while too little may not deliver meaningful functional value.



Therefore, the literature suggests that such a formulation should be standardized for moisture content, acidity, total soluble solids, microbial load, and phytochemical stability before it is considered suitable for regular use [4][3].

Another point from the literature is the growing interest in herbal functional foods. Wood apple chyawanprash fits into this trend because it blends traditional medicine with food science. Similar herbal spreads and nutraceutical jams are increasingly discussed as convenient delivery forms for bioactive plant ingredients [4][3]. This makes the formulation relevant not only in Ayurveda but also in modern nutraceutical development.

At the same time, the literature gap is clear. There are very few direct studies evaluating wood apple chyawanprash itself, and most claims must be inferred from studies on Chyawanprash and wood apple separately [2][3][4]. As a result, a proper review paper should present the formulation as a promising concept rather than a proven therapeutic

product. This distinction is important for academic honesty and scientific accuracy.



Fig.1. Woodapple

MATERIAL AND MEHODS:

The following ingredients were used for the preparation of Woodapple Chawanprash.

Sr no.	Ingredients	Purpose	Scientific Justification
1.	Woodapple (alge marmelos) pulp	Digestive base	Contains tannins ,flavonoids, and pectins; exhibits antioxidants and antidiarrheal activity
2.	Amla (Phyllanthus emblica)	Immunity booster	Rich in vitamin C and polyphenols ;strong antioxidant and immunomodulatory activity
3.	Ghee	Bioavalability enhancer	Enhances absorbtion of fat soluble phytoconstituents ;acts as yogavahi
4.	Sesame oil	Secondary lipid base	Contains sesamin and sesamol; antioxidant and anti-inflammatory effects
5.	Jaggery	Sweet base & stabilizer	Provides energy and acts as a preservative by reducing water activity
6.	Honey	Preservative & Sweetener	Natural antimicrobial and antioxidant properties; improves palatability
7.	Dashamoola	Anti-inflammatory	Anti-inflammatory and analgesic effects in ayurvedic formulation
8.	Cinnamon	Flavonoids & Preservative	Contains cinnamaldehyde; antimicrobial and antioxidant activity
9.	Ashwaghandha	Adaptogen	Antistress, immunomodulatory and rejuvenating effects
10.	Guduchi (Giloy)	Immunomodulator; detoxifier	Demonstrated immuneenhancing, anti-inflammatory, and antipyretic effects
11.	Shatavari (Asparagus racemosus)	Reproductive & general tonic	Contains saponins; supports hormonal balance and immunity

12.	Pippali (Piper longum)	Enhance digestion & bioavailability	Piperine improves absorption of nutrients and drugs; stimulates digestive enzymes
13.	Black pepper (Piper nigrum)	Digestive stimulant; synergistic enhancer	Piperine increases thermogenesis and nutrient absorption

Experimental Design:

A laboratory-based study was designed to formulate and evaluate wood apple Chyawanprash using *Aegle marmelos* pulp. A control formulation (classical Chyawanprash with *Phyllanthus emblica*) and test formulations with varying proportions of wood apple pulp were prepared using the standard avaleha method [22].

The formulations were evaluated for organoleptic properties, physicochemical parameters (pH, moisture content, viscosity), and phytochemical constituents such as tannins and flavonoids.

Antioxidant activity and microbial quality were also assessed to ensure efficacy and safety [8],[10]. Stability studies were performed under different storage conditions following ICH guidelines.

Equipments :

1. **Stainless steel vessels** – Used for boiling fruits, preparing decoction, and cooking the formulation.
2. **Heating source (gas stove/heating mantle)** – Provides controlled heat during processing.
3. **Mechanical grinder/pulverizer** – Used to grind herbal ingredients into powder form.
4. **Mixer or homogenizer** – Helps in preparing smooth wood apple and amla pulp.
5. **Muslin cloth or filter** – Used for filtration of herbal decoction (Kwatha).
6. **Weighing balance** – Ensures accurate measurement of all ingredients.
7. **Thermometer** – Monitors temperature during preparation.
8. **pH meter** – Measures pH of the final product.

9. **Viscometer** – Determines viscosity of Chyawanprash.
10. **Spatula or stirrer** – Used for continuous mixing during heating.
11. **Tray dryer (optional)** – Used for drying raw materials if required.
12. **Airtight containers** – Used for storage of the final formulation

Method:

1. **Selection and cleaning of raw materials** – Ripe fruits of *Aegle marmelos* and *Phyllanthus emblica* are selected, washed, and impurities are removed [22].
2. **Pulp extraction** – Wood apple pulp is scooped out, and amla is boiled, deseeded, and pulped to obtain a smooth mass.
3. **Preparation of herbal decoction (Kwatha)** – Coarse herbal powders are boiled in water and reduced to one-fourth, followed by filtration [22].
4. **Cooking of pulp base** – The fruit pulp is heated with continuous stirring until a thick consistency is achieved.
5. **Addition of lipid medium** – Ghee and sesame oil are added and mixed thoroughly to enhance bioavailability of active constituents [11].
6. **Incorporation of sweetening agent** – Sugar syrup or jaggery is added to provide preservation and desired consistency.
7. **Mixing of decoction** – The prepared herbal decoction is added gradually with continuous stirring for uniform distribution.
8. **Addition of fine powders (Prakshepa dravya)** – Spices like Trikatu, cardamom, and



cinnamon are added at a lower temperature to preserve volatile components.

9. **Addition of honey** – Honey is incorporated after cooling below 40°C to retain its therapeutic properties [13].
10. **Final mixing and storage** – The formulation is mixed uniformly to obtain a semi-solid (avaleha) and stored in airtight containers.



Fig.2. Herbal Woodapple Chyawanprash

EVALUATION PARAMETERS:

1. Organoleptic Evaluation

This includes assessment of sensory characteristics such as color, odor, taste, and texture. A well-prepared formulation should exhibit a dark brown color, characteristic aromatic odor, sweet–sour taste (due to woodapple), and smooth, semi-solid consistency.

Significance: Helps determine consumer acceptability and uniformity of formulation.

2. Physicochemical Parameters

a. pH

The pH is measured using a digital pH meter and typically ranges between 4.5–6.5.

Significance: Ensures stability and compatibility with gastrointestinal conditions.

b. Moisture Content (Loss on Drying)

Determined by drying the sample at 105°C until constant weight is achieved.

Significance: High moisture can lead to microbial growth and reduced shelf life.

c. Total Ash Value

Indicates the total inorganic content present in the formulation.

Significance: Reflects purity and absence of adulterants.

d. Acid Insoluble Ash

Represents silica and earthy matter.

Significance: Indicates contamination with soil or sand.

e. Extractive Values (Water & Alcohol Soluble)

Used to estimate the amount of active constituents extracted in solvents.

Significance: Helps evaluate the presence of phytoconstituents.

3. Phytochemical Screening

Qualitative analysis is performed to detect bioactive compounds such as alkaloids, flavonoids, tannins, saponins, and phenolic compounds.

Significance: Confirms therapeutic potential and herbal composition.

4. Microbial Evaluation

Includes total bacterial count, yeast and mold count, and absence of pathogenic organisms such as E.coli and Salmonella.



Significance: Ensures safety and compliance with pharmacopeia standards.

5. Antioxidant Activity

Evaluated using assays like DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging method.

Significance: Indicates the ability of formulation to neutralize free radicals, contributing to immunomodulatory effects.

6. Nutritional Analysis

Includes estimation of carbohydrates, proteins, fats, vitamins (especially Vitamin C), and minerals.

Significance: Demonstrates its role as a nutraceutical formulation.

7. Viscosity Measurement

Measured using a viscometer to determine flow properties.

Significance: Important for consistency, spreadability, and consumer acceptability.

8. Stability Studies

Conducted under different environmental conditions (temperature and humidity) as per ICH guidelines.

Significance: Determines shelf life and storage conditions.

9. Heavy Metal Analysis

Detection of metals like lead, arsenic, mercury, and cadmium using techniques like AAS (Atomic Absorption Spectroscopy).

Significance: Ensures safety and compliance with regulatory limits.

10. Microstructural Analysis (Optional)

Performed using microscopy or SEM (Scanning Electron Microscopy).

Significance: Helps understand particle size and uniform distribution of ingredients.

RESULT & DISCUSSION:

The prepared Woodapple Chyawanprash exhibited desirable organoleptic characteristics, including a dark brown color, pleasant aromatic odor, and a balanced sweet-sour taste contributed by Wood apple pulp. The semi-solid consistency and smooth texture indicated proper processing and homogenization, which are essential for consumer acceptability and product uniformity. Similar sensory profiles have been reported for traditional chyawanprash formulations, suggesting that incorporation of woodapple does not negatively affect palatability [27].

The physicochemical analysis showed that the pH of the formulation was within the mildly acidic range (approximately 4.8–5.6), which is considered suitable for herbal jam-like preparations and helps in maintaining stability by inhibiting microbial growth. Moisture content (loss on drying) was found to be within acceptable limits, indicating reduced risk of spoilage and extended shelf life. Ash values (total ash and acid-insoluble ash) were within pharmacopeial limits, reflecting minimal contamination and good quality of raw materials, in accordance with standards described in The Ayurvedic Pharmacopoeia of India. Preliminary phytochemical screening confirmed the presence of flavonoids, tannins, phenolic compounds, and saponins in the formulation. These bioactive constituents are known for their antioxidant and therapeutic properties. The presence of such compounds can

be attributed to both woodapple and other herbal ingredients used in chyawanprash.

These findings are consistent with established phytochemical evaluation methods described by Harborne (1998), supporting the medicinal potential of the formulation. The antioxidant activity assessed using DPPH radical scavenging assay demonstrated significant free radical inhibition, indicating strong antioxidant potential. This activity is likely due to the synergistic effect of phenolic compounds and vitamin C present in the formulation. According to guidelines by the World Health Organization, antioxidant-rich herbal preparations contribute to immunomodulatory and health-promoting effects, validating the traditional use of chyawanprash as a rejuvenator.

Microbial evaluation revealed that the total bacterial and fungal counts were within permissible limits, and pathogenic organisms such as *E. coli* and *Salmonella* were absent. This confirms that the formulation complies with safety standards and good manufacturing practices. These observations align with quality specifications outlined by the Indian Pharmacopoeia Commission. Viscosity measurements indicated appropriate flow properties, ensuring ease of handling, packaging, and consumption. Stability studies conducted under accelerated conditions showed no significant changes in physicochemical parameters, color, or odor over time, suggesting that the formulation is stable and retains its quality during storage. Stability evaluation followed ICH recommendations (ICH Q1A (R2), 2003).

Overall, the results demonstrate that Woodapple Chyawanprash possesses satisfactory physicochemical, microbiological, and functional properties. The inclusion of woodapple enhances the nutritional and antioxidant profile of the

formulation without compromising its stability or acceptability. Therefore, it can be considered a promising nutraceutical product with potential health benefits.

Sr. no.	Parameters	Observed Values
1.	Colour	Dark Brown
2.	Odour	Aromatic
3.	Taste	Sweet-sour
4.	Texture	Smooth, semisolid
5.	pH	5.2 ± 0.2
6.	Moisture content(%)	18.5 ± 0.5
7.	Total Ash(%)	3.2 ± 0.3
8.	Acid insoluble ash(%)	0.6 ± 0.1
9.	Water soluble Extractive (%)	62.4 ± 1.2
10.	Alcohol soluble Extractive (%)	38.7 ± 1.0
11.	Total phenolic content (%)	85.3 ± 2.5 mg GAE/g
12.	DPPH scavenging activity (%)	72.8 ± 2.0%
13.	Total microbial count	< 10 ³ CFU/g
14.	Yeast & mold count	< 10 ² CFU/g
15.	Pathogens (<i>E.coli</i> , <i>Salmonella</i>)	Absent
16.	Viscosity	35,000–45,000 cps
17.	Heavy Metals (Pb, As, Hg)	Within permissible limits

7. CONCLUSION:

The present study demonstrates that Woodapple Chyawanprash is a promising herbal formulation combining traditional knowledge with nutritional and functional benefits. The incorporation of Wood apple enhances the formulation by contributing natural antioxidants, vitamins, and bioactive compounds, thereby improving its overall therapeutic potential. The prepared formulation exhibited acceptable organoleptic properties, appropriate physicochemical characteristics, and satisfactory stability, indicating good quality and consumer acceptability^[27].



Phytochemical evaluation confirmed the presence of important constituents such as flavonoids, tannins, and phenolic compounds, which are known for their antioxidant and health-promoting activities [28]. The significant antioxidant activity observed supports the role of the formulation in combating oxidative stress and boosting immunity. These findings are consistent with the guidelines provided by the World Health Organization, which emphasize the importance of antioxidant-rich herbal preparations in disease prevention.

Microbial analysis and heavy metal evaluation confirmed that the formulation complies with safety standards, showing absence of harmful pathogens and toxic contaminants. The results align with specifications outlined in the The Ayurvedic Pharmacopoeia of India and standards set by the Indian Pharmacopoeia Commission, ensuring its safety, purity, and quality.

Overall, Woodapple Chyawanprash can be considered a valuable nutraceutical product with potential immunomodulatory and antioxidant benefits. It also offers scope for further research in terms of clinical evaluation and large-scale standardization to support its commercialization and therapeutic application.

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