IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ASSESSMENT OF CRUDE DRUGS AND DEVELOPMENT OF POLYHERBAL CREAM FORMULATION USING *ASPARAGUS RACEMOSUS* AND *BACOPA MONNIERI* AS PER WHO GUIDELINES

[1] Vaishnavi Nikam, [2] Ghanshyam Nawale, [3] Dr. Abhijit Pohekar

[1]Student of Sayali Charitable Trust's College of Pharmacy, Mitmita, Chhatrapati Chhatrapati Sambhaji nagar,

[2]Professor of Sayali Charitable Trust's College of Pharmacy, Mitmita, Chhatrapati Sambhaji nagar.

, [33]Principal of Sayali Charitable Trust's College of Pharmacy, Mitmita, Chhatrapati Sambhaji nagar

[1]Pharmacy,

[1] Sayali Charitable Trust's College of Pharmacy, Mitmita, Chhatrapati Chhatrapati Sambhaji nagar, India

Abstract: Herbal medicines are widely used throughout the world due to their therapeutic potential, affordability, safety, and cultural acceptance. However, lack of proper standardization and quality evaluation remains a major challenge in herbal drug development. The present research work was carried out to evaluate crude drugs and develop a polyherbal cream formulation using *Asparagus racemosus* and *Bacopa monnieri* according to World Health Organization (WHO) guidelines. Pharmacognostic evaluation including macroscopic and microscopic studies was performed for authentication of crude drugs. Physicochemical parameters such as total ash value, acid insoluble ash, water soluble ash, sulphated ash, moisture content, and extractive values were determined. Preliminary phytochemical screening was conducted to identify major phytoconstituents present in methanolic extracts. Thin layer chromatography (TLC) profiling was carried out for fingerprint analysis. A polyherbal cream was prepared using methanolic extracts of both plants and evaluated for physicochemical properties including color, odour, texture, pH, spreadability, and emolliency.

The results confirmed the presence of important phytoconstituents such as alkaloids, flavonoids, glycosides, tannins, carbohydrates, and saponins. Physicochemical parameters were found within acceptable limits according to WHO guidelines. TLC studies showed characteristic RF values indicating the presence of active constituents. The prepared herbal cream exhibited good homogeneity, smooth texture, satisfactory spreadability, and acceptable emollient properties. The study concluded that *Asparagus racemosus* and *Bacopa monnieri* possess significant phytochemical and physicochemical properties suitable for herbal formulation development. The formulated polyherbal cream demonstrated satisfactory evaluation parameters and may be useful for cosmetic and therapeutic applications.

Index Terms - Herbal cream, Asparagus racemosus, Bacopa monnieri, WHO guidelines, phytochemical screening, TLC profiling, herbal formulation.

I. INTRODUCTION

Medicinal plants have been used since ancient times for prevention and treatment of various diseases. Traditional systems of medicine such as Ayurveda, Siddha, Unani, and Traditional Chinese Medicine extensively utilize plant-based remedies for maintaining human health and treating several disorders [1-4]. Herbal medicines are defined as preparations containing active ingredients obtained from plant materials or naturally occurring plant-derived substances. According to the World Health Organization (WHO), herbal medicines include herbs, herbal materials, herbal preparations, and finished herbal products containing plant parts as active ingredients [1,2].

The importance of herbal medicines has increased considerably in recent years because of their therapeutic potential, lower side effects, affordability, and better patient acceptance. Approximately 80% of the world population depends directly or indirectly on herbal medicines for primary healthcare needs [1,7]. However, concerns regarding quality, safety, efficacy, adulteration, microbial contamination, and standardization remain major challenges in herbal drug development [2,5]. Therefore, proper evaluation and standardization of herbal drugs are necessary to ensure quality, purity, identity, and reproducibility of herbal formulations.

WHO has recommended several quality control parameters for herbal drug standardization including authentication, organoleptic evaluation, microscopic examination, physicochemical evaluation, phytochemical screening, chromatographic profiling, and contamination studies [2,7]. Standardization ensures consistency in therapeutic activity and helps in detection of adulteration and substitution.

Asparagus racemosus (Shatavari) is an important medicinal plant belonging to the family Asparagaceae and is widely used in Ayurveda for its rejuvenating, adaptogenic, antioxidant, immunomodulatory, and antiulcer activities [9,12,13]. The plant mainly contains steroidal saponins such as Shatavarins along with flavonoids, alkaloids, and glycosides.

Bacopa monnieri (Brahmi) belonging to the family Plantaginaceae is a well-known medicinal herb traditionally used as a memory enhancer and neuroprotective agent. The plant contains bacosides, alkaloids, flavonoids, triterpenoids, and phenolic compounds responsible for antioxidant and cognitive enhancing activities [10,11,14].

Herbal creams are semisolid preparations intended for external application and are commonly used for cosmetic and therapeutic purposes. Polyherbal formulations containing multiple medicinal plants may provide synergistic therapeutic effects due to the presence of diverse phytoconstituents.

The present study was therefore designed to assess and standardize crude drugs of *Asparagus racemosus* and *Bacopa monnieri* according to WHO guidelines and to develop and evaluate a polyherbal cream formulation using methanolic extracts of both plants.

II. MATERIALS AND METHODS

Collection and Authentication of Plant Material

The selected crude drugs, *Asparagus racemosus* and Bacopa monnieri, were collected from the Pharmacognosy laboratory and authenticated based on standard pharmacognostic characteristics.

Figure 1: Morphology of Asparagus racemosus (Shatavari)

Figure 2: Morphology of Bacopa monnieri (Brahmi)

Macroscopic Evaluation

The crude drugs were subjected to organoleptic and macroscopic evaluation using parameters such as color, odour, taste, shape, texture, and surface characteristics.

Microscopical Evaluation

Fresh samples of both plants were used for microscopic evaluation. Thin transverse sections were prepared and stained appropriately before observation under microscope for identification of characteristic tissues.

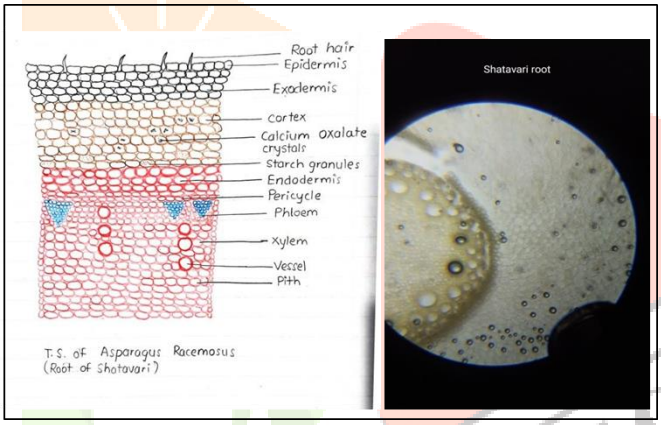

Figure 3: : T.S. of Asparagus racemosus (Shatavari root)

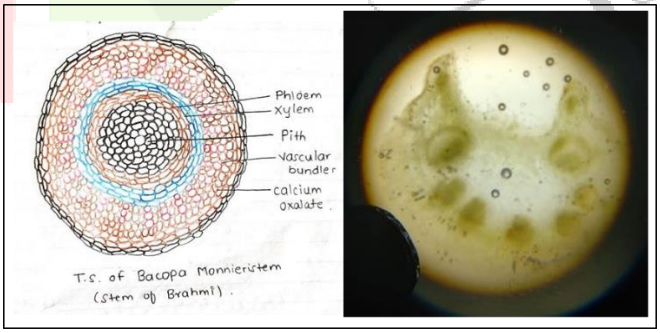

Figure 4: T.S. of Bacopa monnieri (Brahmi stem)

Physicochemical Evaluation

Physicochemical parameters were evaluated according to WHO guidelines. The following parameters were determined:

Total ash value
Acid insoluble ash
Water soluble ash
Sulphated ash
Moisture content

Alcohol soluble extractive value
Water soluble extractive value

Extraction Procedure

The crude drugs were shade dried, powdered, and subjected to methanolic extraction using Soxhlet apparatus. The obtained extracts were concentrated and stored for further studies.

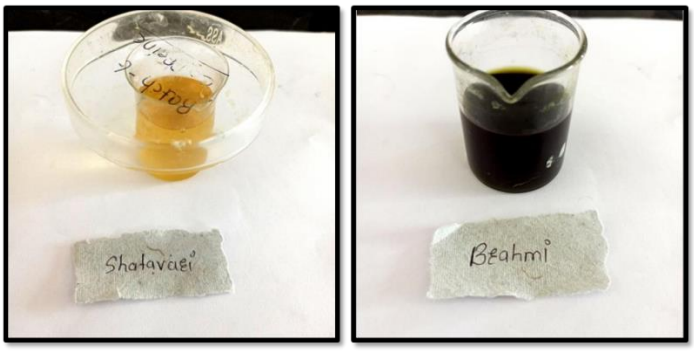

Figure 5: Extract of Shatavari and Brahmi

Preliminary Phytochemical Screening

The methanolic extracts were subjected to qualitative phytochemical tests for identification of:

Carbohydrates
Alkaloids
Glycosides
Amino acids
Flavonoids
Tannins
Saponins

Thin Layer Chromatography

TLC studies were carried out using silica gel coated plates and suitable solvent systems. Developed plates were visualized under UV light and iodine chamber for fingerprint profiling.

Table 1: TLC Solvent System Used

SOLVENT SYSTEM	RATIO
Chloroform : Methanol	90:10
n-butanol : Acetic acid : water	4:1:5
n-butanol : Acetic acid : Water	36:6:8
Toluene : Ethyl Acetate	8:2
Toluene : Ethyl Acetate	6:4

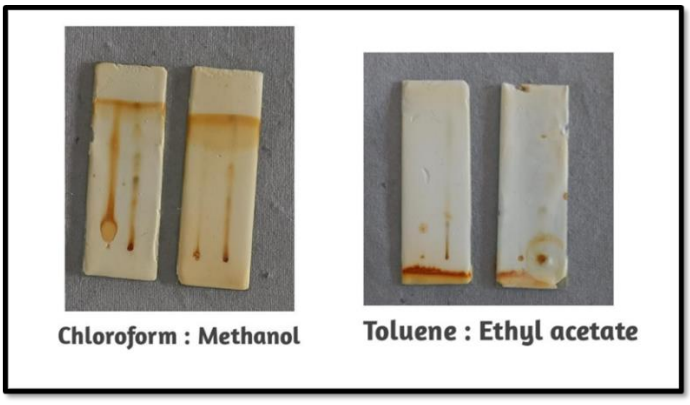

Figure 6: Thin Layer Chromatography Plates

Formulation of Polyherbal Cream

The polyherbal cream was prepared by emulsification method using methanolic extracts of Asparagus racemosus and Bacopa monnieri. The formulation ingredients included stearic acid, cetyl alcohol, beeswax, liquid paraffin, methyl paraben, propyl paraben, glycerin, distilled water, and herbal extracts.

Initially, the oil phase consisting of stearic acid, cetyl alcohol, beeswax, and liquid paraffin was weighed accurately and heated at 70–75°C until complete melting was achieved. Simultaneously, the aqueous phase containing glycerin, methyl paraben, propyl paraben, and distilled water was heated separately at the same temperature.

The methanolic extracts of Asparagus racemosus and Bacopa monnieri were dissolved in a small quantity of warm distilled water and incorporated into the aqueous phase with continuous stirring.

The heated aqueous phase was then added slowly into the oil phase with continuous stirring using a mechanical stirrer to obtain a uniform emulsion. Stirring was continued until a smooth semisolid cream consistency was formed. The prepared cream was allowed to cool to room temperature and then transferred into suitable airtight containers for further evaluation studies.

Three different batches of herbal cream formulation were prepared by varying the concentration of herbal extracts for optimization of formulation parameters.

Table 2: Formulas for Herbal Cream Preparation

SR. NO.	CONTENTS	F1	F2	F3	Function
1	White beeswax	5gm	5gm	5gm	Stiffener
2	Liquid paraffin	7ml	6.5ml	7.5ml	Emollient
3	Borax	2gm	2gm	2 gm	Emulsifier
4	Water	5ml	5ml	5ml	Vehicle
5	Rose water	2 drops	2 drops	2 drops	Fragrance
6	*Asparagus racemosus*	200mg	200mg	200mg	Antioxidant
7	*Bacopa monnieri*	200mg	200mg	200mg	Neuroprotective
8	Aloe vera gel	1gm	1.5gm	0.5gm	Moisturizer
9	Methyl paraben	0.02gm	0.02gm	0.02gm	Preservative
10	Ethyl alcohol	2ml	2ml	2ml	Solvent

Evaluation of Polyherbal Cream

The prepared cream formulation was evaluated for:

Colour
Odour
Texture
State
pH
Spreadability
Emolliency

III. RESULTS AND DISCUSSION

Organoleptic and Macroscopic Evaluation

The roots of *Asparagus racemosus* were creamish white in color with characteristic odour and sweetish taste. *Bacopa monnieri* showed green leaves with characteristic odour and bitter taste. The observed organoleptic characteristics confirmed the identity and purity of selected crude drugs.

Table 3: Macroscopic and Organoleptic Characters of Crude Drugs (Shatavari and Brahmi)

Parameter	**Shatavari**	**Brahmi**
Colour	Cream	Bright Green
Odour	Characteristic	Characteristic
Taste	Sweetish	Bitter
Shape	Cylindrical	Rounded
Surface	Soft	Thin

Macroscopic evaluation is an important preliminary step in herbal drug standardization and helps in detection of adulteration.

Microscopical Evaluation

Microscopic examination of *Asparagus racemosus* root showed cork cells, phloem parenchyma, sieve tubes, and companion cells. *Bacopa monnieri* showed characteristic stem tissues and cellular arrangement. These pharmacognostic features were found comparable with standard reported characteristics.

Physicochemical Evaluation

The physicochemical parameters of both crude drugs were evaluated and the results are summarized below.

Table 4: Physicochemical Evaluation Parameter:

Parameter	**Shatavari**	**Brahmi**
Total Ash	12.5%	10.6%
Acid Insoluble Ash	0.5%	1.3%
Water Soluble Ash	3.4%	2.2%
Sulphated Ash	1.7%	1.94%
Alcohol Soluble Extractive	42.50%	37.14%
Water Soluble Extractive	38.70%	31.89%
Moisture Content	4.92%	4.10%

The ash values indicated low levels of inorganic impurities and siliceous matter. Moisture content was found within acceptable range indicating reduced risk of microbial contamination. High extractive values indicated presence of appreciable amounts of polar phytoconstituents.

Preliminary Phytochemical Screening

The phytochemical screening results confirmed the presence of several therapeutically important phytoconstituents.

Table 5: Preliminary Phytochemical Screening Of Crude Drug

Phytoconstituent	Shatavari	Brahmi
Carbohydrates	+	+
Alkaloids	+	+
Glycosides	+	+
Amino acids	-	-
Flavonoids	+	+
Tannins	+	-
Saponins	+	+

Flavonoids and saponins are known for antioxidant and anti-inflammatory activities, while glycosides and alkaloids contribute to pharmacological actions of the selected medicinal plants.

Extraction Studies

Methanol extraction yielded concentrated extracts with characteristic color and consistency.

Table 6: Extraction of Crude Drug

Parameter	Shatavari	Brahmi
Solvent	Methanol	Methanol
Yield	37% w/w	31% w/w
Colour	Light Brown	Dark Green
Nature	Sticky	Sticky

The higher extractive yield obtained in Shatavari may be due to the presence of greater amount of methanol soluble constituents.

Thin Layer Chromatography

TLC fingerprint profiling revealed characteristic spots for both extracts under UV and iodine chamber.

Table 7: RF Value of Crude Drug

Solvent System	RF Value					
	Shatavari			Brahmi		
Chloroform : Methanol	0.78	0.75	0.70	0.79	0.74	0.80
Toluene : Ethyl Acetate	0.87	0.89	0.83	0.87	0.84	0.86
n- butanol : Acetic acid : water	0.82	0.79	0.80	0.87	0.88	0.82
Toluene : Ethyl Acetate	0.84	0.86	0.79	0.81	0.76	0.84
n- butanol : Acetic acid : water	0.87	0.90	0.84	0.80	0.84	0.81

The TLC profile can be utilized as a reference standard for identification and quality control of crude drugs.

Evaluation of Polyherbal Cream

The prepared polyherbal cream formulation was evaluated for physicochemical parameters.

Table 8: Evaluation Parameters of Cream

Parameter	Batch 1	Batch 2	Batch 3
Colour	Cream White	Cream White	Cream White
Odour	Characteristic	Characteristic	Characteristic
Texture	Smooth	Smooth	Smooth
State	Semisolid	Semisolid	Semisolid
pH	8.20	8.18	8.00
Spreadability	Good	Good	Good
Emolliency	Good	Good	Good

The formulated cream showed smooth texture, acceptable spreadability, good emollient property, and satisfactory appearance. The pH was slightly alkaline and may require further optimization for better skin compatibility.

The overall evaluation results suggested that the prepared polyherbal cream possesses suitable physicochemical characteristics and may be useful for cosmetic and therapeutic applications.

Figure 7: Herbal Cream

CONCLUSION

The present study successfully evaluated and standardized crude drugs of *Asparagus racemosus* and *Bacopa monnieri* according to WHO guidelines. Pharmacognostic studies including organoleptic and microscopic evaluation confirmed the identity and authenticity of selected medicinal plants. Physicochemical parameters such as ash values, extractive values, and moisture content were found within acceptable limits.

Preliminary phytochemical screening confirmed the presence of important phytoconstituents including alkaloids, flavonoids, glycosides, tannins, and saponins responsible for therapeutic properties. TLC fingerprint profiling provided characteristic chromatographic patterns useful for standardization and quality control.

A polyherbal cream formulation was successfully prepared using methanolic extracts of both plants. The formulation exhibited satisfactory physicochemical properties including smooth texture, good spreadability, and acceptable emolliency.

The study concluded that *Asparagus racemosus* and *Bacopa monnieri* are promising herbal ingredients for development of herbal cosmetic and therapeutic formulations. Further studies such as stability studies, antimicrobial activity, skin irritation testing, and clinical evaluation are recommended.

REFERENCES

1. World Health Organization. WHO traditional medicine strategy 2014–2023. Geneva: World Health Organization; 2013.
2. World Health Organization. Quality control methods for herbal materials. Geneva: World Health Organization; 2011.
3. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 56th ed. Pune: Nirali Prakashan; 2019.
4. Trease GE, Evans WC. Trease and Evans Pharmacognosy. 16th ed. London: Saunders Elsevier; 2009.
5. Mukherjee PK. Quality control of herbal drugs: an approach to evaluation of botanicals. New Delhi: Business Horizons Pharmaceutical Publishers; 2002.
6. Khandelwal KR. Practical Pharmacognosy: Techniques and Experiments. 30th ed. Pune: Nirali Prakashan; 2019.
7. World Health Organization. WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues. Geneva: World Health Organization; 2007.
8. Ekor M. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. Front Pharmacol. 2014;4:177. https://doi.org/10.3389/fphar.2013.00177.
9. Hayes PY, Jahidin AH, Lehmann R, Penman K, Kitching W, De Voss JJ. Steroidal saponins from the roots of Asparagus racemosus. Phytochemistry. 2008;69(3):796-804. https://doi.org/10.1016/j.phytochem.2007.09.001.
10. Russo A, Borrelli F. Bacopa monnieri, a reputed nootropic plant: an overview. Phytomedicine. 2005;12(4):305-17. https://doi.org/10.1016/j.phymed.2003.12.008.
11. Stough C, Lloyd J, Clarke J, Downey LA, Hutchison CW, Rodgers T, et al. Erratum to: The chronic effects of an extract of Bacopa monniera (Brahmi) on cognitive function in healthy human subjects. Psychopharmacology 2015;232:2427–2427. https://doi.org/10.1007/s00213-015-3965-3.
12. Gautam M, Diwanay S, Gairola S, Shinde Y, Jadhav S, Patki P. Immunoadjuvant potential of *Asparagus racemosus* aqueous extract in experimental system. J Ethnopharmacol. 2004;91(2-3):251-5. https://doi.org/10.1016/j.jep.2003.12.023.
13. Bopana N, Saxena S. Asparagus racemosus—Ethnopharmacological evaluation and conservation needs. J Ethnopharmacol. 2007;110(1):1-15. https://doi.org/10.1016/j.jep.2007.01.001
14. Aguiar S, Borowski T. Neuropharmacological review of the nootropic herb Bacopa monnieri. Rejuvenation Res. 2013;16(4):313-26. https://doi.org/10.1089/rej.2013.1431.
15. Calabrese C, Gregory WL, Leo M, Kraemer D, Bone K, Oken B. Effects of a standardized *Bacopa monnieri* extract on cognitive performance, anxiety, and depression in the elderly. J Altern Complement Med. 2008;14(6):707-13. https://doi.org/10.1089/acm.2008.0018.