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PREPARATION OF HERBAL GEL FROM TURMERIC AND EASTERN WHITE-CEDAR

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Abstract

The main aim of study is The Preparation of herbal gel from turmeric and eastern white-cedar. To prepare herbal gel from turmeric and eastern white-cedar and Poly herbal gel was prepared with water soluble polymer Carbopol 934. To evaluate physicochemical properties and stability of herbal gel. Plant materials: Plants of turmeric and eastern white-cedar were collected from local area. Plant materials selected for the study were washed thoroughly under running tap water and then were rinsed in distilled water; they were allowed to dry for some time at room temperature. Then the plant material was shade dried without any contamination for about 3 to 4 weeks. Dried plant material was grinded using electronic grinder. Powdered plant material was observed for their colour, odour, taste and texture. Results and discussion: Physio-Chemical Constants Ash value: The total ash usually consists of carbonate, phosphate and silicates. Total ash: The total ash content of the raw materials were determined, taking sample from the collected materials calculated in table below. Conclusion: The phytochemical constant was carried out for the plants powder and extracts of turmeric and eastern white-cedar to bring the quality and purity of the valuable medicinal plants. Preliminary phytochemical screening was carried out for all the plants and its extracts to determine the presence of active principle in plants.

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Introduction

Turmeric: *Curcuma longa* is a flowering plant in the ginger family Zingiberaceae [1]. It is a perennial, rhizomatous, herbaceous plant native to the Indian subcontinent and Southeast Asia that requires temperatures between 20 and 30 °C (68 and 86 °F) and high annual rainfall to thrive [2]. Plants are gathered each year for their rhizomes, some for propagation in the following season and some for consumption [3-5]. The rhizomes are used fresh or boiled in water and dried, after which they are ground into a deep orange-yellow powder commonly used as a coloring and flavoring agent in many Asian cuisines, especially for curries, as well as for the dyeing characteristics imparted by the principal turmeric constituent, curcumin [6].

Turmeric powder has a warm, bitter, black pepper-like flavour and earthy, mustard-like aroma [7, 8].

Curcumin, a bright yellow chemical produced by the turmeric plant, is approved as a food additive by the World Health Organization, European Parliament, and United States Food and Drug Administration [6].

Although long used in Ayurvedic medicine, where it is also known as *haridra*, [9] there is no high-quality clinical evidence that consuming turmeric or curcumin is effective for treating any disease [10, 11].

The greatest diversity of *Curcuma* species by number alone is in India, at around 40 to 45 species. Thailand has a comparable 30 to 40 species. Other countries in tropical

Asia also have numerous wild species of *Curcuma*. Recent studies have also shown that the taxonomy of *C. longa* is problematic, with only the specimens from South India being identifiable as *C. longa*. The phylogeny, relationships, intraspecific and interspecific variation, and even identity of other species and cultivars in other parts of the world still need to be established and validated. Various species currently utilized and sold as "turmeric" in other parts of Asia have been shown to belong to several physically similar taxa, with overlapping local names.

Scientific classification	
Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Monocots
Clade:	Commelinids
Order:	Zingiberales
Family:	Zingiberaceae
Genus:	*Curcuma*
Species:	***C. longa***
Binomial name	
Curcuma longa L. [1]	
Synonyms	
Curcuma domestica Valeton	

History

Turmeric has been used in Asia for centuries and is a major part of Ayurveda, Siddha medicine, traditional Chinese medicine, Unani,[14] and the animistic rituals of Austronesian peoples [15, 16]. It was first used as a dye, and then later for its supposed properties in folk medicine [10, 11].

From India, it spread to Southeast Asia along with Hinduism and Buddhism, as the yellow dye is used to color the robes of monks and priests. Turmeric has also been found in Tahiti, Hawaii and Easter Island before European contact [17]. There is linguistic and circumstantial evidence of the spread and use of turmeric by the Austronesian peoples into Oceania and Madagascar. The populations in Polynesia and Micronesia, in particular, never came into contact with India, but use turmeric widely for both food and dye. Thus independent domestication events are also likely [15, 16].

Turmeric was found in Farmana, dating to between 2600 and 2200 BCE, and in a merchant's tomb in Megiddo, Israel, dating from the second millennium BCE [18]. It was noted as a dye plant in the Assyrins' Cuneiform medical texts from Ashurbanipal's library at Nineveh from 7th century BCE [17]. In Medieval Europe, turmeric was called "Indian saffron" [17].

Turmeric is a perennial herbaceous plant that reaches up to 1 m (3 ft 3 in) tall. It has highly branched, yellow to orange, cylindrical, aromatic rhizomes.

The leaves are alternate and arranged in two rows. They are divided into leaf sheath, petiole, and leaf blade. From the leaf sheaths, a false stem is formed. The petiole is 50 to 115 cm (20–45 in) long. The simple leaf blades are usually 76 to 115 cm (30–45 in) long and rarely up to 230 cm (7 ft 7 in). They have a width of 38 to 45 cm (15 to 17+1/2 in) and are oblong to elliptical, narrowing at the tip [1].

Inflorescence, flower, and fruit

At the top of the inflorescence, stem bracts are present on which no flowers occur; these are white to green and sometimes tinged reddish-purple, and the upper ends are tapered [21].

The hermaphrodite flowers are zygomorphic and threefold. The three sepals are 0.8 to 1.2 cm (3/8 to 1/2 in) long, fused, and white, and have fluffy hairs; the three calyx teeth are unequal. The three bright-yellow petals are fused into a corolla tube up to 3 cm (1+1/4 in) long. The three corolla lobes have a length of 1.0 to 1.5 cm (3/8–5/8 in) and are triangular with soft-spiny upper ends. While the average corolla lobe is larger than the two lateral, only the median stamen of the inner circle is fertile. The dust bag is spurred at its base. All other stamens are converted to staminodes. The outer staminodes are shorter than the labellum. The labellum is yellowish, with a yellow ribbon in its center and it is obovate, with a length from 1.2 to 2.0 cm (1/2 to 3/4 in). Three carpels are under a constant, trilobed ovary adherent, which is sparsely hairy. The fruit capsule opens with three compartments [22, 23].

In East Asia, the flowering time is usually in August. Terminally on the false stem is an inflorescence stem, 12 to 20 cm (4+1/2 to 8 in) long, containing many flowers. The bracts are light green and ovate to oblong with a blunt upper end with a length of 3 to 5 cm (1 to 2 in) [21].

Phytochemistry

Turmeric powder is about 60–70% carbohydrates, 6–13% water, 6–8% protein, 5–10% fat, 3–7% dietary minerals, 3–7% essential oils, 2–7% dietary fiber, and 1–6% curcuminoids [10]. The golden yellow color of turmeric is due to curcumin [6].

Phytochemical components of turmeric include diarylheptanoids, a class including numerous curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin [10, 6]. Curcumin constitutes up to 3.14% of assayed commercial samples of turmeric powder (the average was 1.51%); curry powder contains much less (an average of 0.29%) [24]. Some 34 essential oils are present in turmeric, among which turmerone, germacrone, atlantone, and zingiberene are major constituents [25-27].

Uses

Turmeric is one of the key ingredients in many Asian dishes, imparting a mustard-like, earthy aroma and pungent, slightly bitter flavor to foods. It is used mostly in savory dishes, but also is used in some sweet dishes, such as the cake *sfouf*. In India, turmeric leaf is used to prepare special sweet dishes, *patoleo*, by layering rice flour and coconut-jaggery mixture on the leaf, then closing and steaming it in a special utensil (*chondrõ*).[28] Most turmeric is used in the form of rhizome powder to impart a golden yellow color [7, 8]. It is used in many products such as canned beverages, baked products, dairy products, ice cream, yogurt, yellow cakes, orange juice, biscuits, popcorn, cereals and sauces. It is a principal ingredient in curry powders [7, 29]. Although typically used in its dried, powdered form, turmeric also is used fresh, like ginger [29].

Aim and Objectives

Aim: The main aim of study is The Preparation of herbal gel from turmeric and eastern white-cedar

Objectives

- To prepare herbal gel from turmeric and eastern white-cedar and Poly herbal gel was prepared with water soluble polymer Carbopol 934.
- To evaluate physicochemical properties and stability of herbal gel.

Materials

Plant materials

Plants of turmeric and eastern white-cedar were collected from local area. Plant materials selected for the study were washed thoroughly under running tap water and then were rinsed in distilled water; they were allowed to dry for some time at room temperature. Then the plant material was shade dried without any contamination for about 3 to 4 weeks. Dried plant material was grinded using electronic grinder. Powdered plant material was observed for their colour, odour, taste and texture.

Methods

Phytochemical studies

The Phytochemical investigation of a plant involves authentication and extraction of plant material; qualitative and quantitative evaluations.

Physio-Chemical Constants [6-7].

Shade dried powdered plant materials for used for the determination of the physio chemical constants in accordance with the WHO guidelines.

i. Determination of ash values: Ash values are helpful in determining the quality and purity of a crude drug in the powdered form. The residue remaining after incarnation is the ash content of the drug, which simply represents inorganic salts, naturally occurring drug or adhering to it or edibility added to it, as a form of adulteration. Ash value of a crude drug is defined as the inorganic residue remaining after incineration, which compiles of inorganic salts, naturally occurring in drug or adhering to it or deliberately added to it as a form of adulteration. Hence it is used for the determination of the quality and purity of the crude drug in the powdered form.

a. Total ash: Total ash method is designed to measure the total amount of material remaining after ignition. They include both physiological ash which is derived from plant tissue itself and non-physiological ash which is the residue of extraneous matter adhering to the plant surface. In this Silica crucible was heated to red hot for 30 minutes and cooled in the desiccators Incinerate about 2 to 3 g accurately weighed, of the ground drug in a tarred silica dish at a temperature not exceeding 4500C until the sample is free from carbon, cooled in desiccators and weighed. The ash obtained was weighed. The percentage of total ash was calculated.

b. Water soluble ash: The difference in weight between the total ash and the residue after treatment of the total ash in water. In this Total ash obtained is boiled for 5 minutes with 25 ml of water, insoluble matter were collected in an ash less filter paper, washed with hot water and ignite for 15 min at a temperature not exceeding 4500. Subtract the weight of this residue in mg from the weight of total ash. Calculate the content of water-soluble ash in mg per gram of air-dried material.

c. Acid insoluble ash: The residue obtained after boiling the total ash with dilute hydrochloric acid, the remaining insoluble matters are ignited and measured. This measures the amount of silica present, especially as sand and siliceous earth. In this the crucible containing total ash of the sample, 25 ml of dilute hydrochloric acid is added. The insoluble matter is collected on an ashless filter paper (Whatman 41) and washed with hot water until the filtrate is neutral. Filter papers containing the insoluble matter to the original crucible, dry on hot plate and ignite to constant weight. Allow the residue to cool in suitable desiccators for 30 minutes and weighed without delay. Content of acid- insoluble ash with reference to the air dried drug is calculated.

ii. Determination of extractive values: Extractive values are useful for the evaluation of phytoconstituents especially when the constituents of a drug cannot be readily estimated by any other means. Further these values indicate the nature of the active constituents present in a crude drug.

a. Determination of water soluble extractive: 5gm of air dried coarsely powdered sample was weighed and macerated with 100ml of chloroform water (95ml distilled water and 5ml chloroform) in a closed flask for 24 hours. It was shaken frequently for six hours and allowed to stand for rest eighteen hours. It was then filtered rapidly; taking precautions against loss of solvent and 25ml of the filtrate was evaporated to dryness in a tarred flat bottomed shallow dish and was dried at 105°C for 1 hour in the hot air oven and cooled in desiccators for 30min and weighed. The process was repeated till a constant weight was ob-

tained; the percentage of water soluble extractive value was calculated with reference to the air dried drug.

b. Determination of alcohol soluble extractive: 5gm of the coarsely powdered sample was weighed and macerated with 100ml 90% ethanol in a closed flask for 24 hours. It was shaken frequently for six hours and allowed to stand for eighteen hours. It was then filtered rapidly, taking precautions against loss of solvent and 25ml of the filtrate was evaporated to dryness in a tarred flat bottomed shallow dish. It was dried at 105°C for 1hour in a hot air oven. The dish was cooled in desiccator and weighed. The process was repeated till the constant weight was obtained. The percentage of alcohol soluble extractive value with reference to the air dried drug was calculated.

c. Determination of ether soluble extractive: The type of ether soluble extractive values determined for evaluation of crude drug is volatile and non-volatile ether soluble extractives. The volatile ether soluble represent volatile oilcontent of drug, while non- volatile ether soluble extractives represent resin, fixed oils or colouring matter present in drugs. The percentage of ether soluble extractive was calculated.

iii. Determination of moisture content

a. Loss on drying: 10 g of the sample substances (without preliminary drying) was taken in a tarred evaporating dish. Use of high speed mill in preparing the samples is avoided. The sample in the tarred evaporating dish was placed in the drying chamber (105°C) for 5 hours and weigh. Drying and weighing is continued every one hour interval until the difference between the two successive sweights is not more than 0.25 percent. Constant weight is reached when the two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in desiccators, show not more than 0.001 g difference. Percentage moisture content is compared with respect to the air dried sample.

Preparation of extract [8]

Extraction is the preliminary step involved in the phytochemical studies. Based on solvent's polarity metabolites are extracted and according to the solubility of the constituents in the solvent. The method of extraction is maceration method. This is an extraction procedure in which coarsely powdered drug material, either leaves or stem bark or root bark, is placed inside a container; the menstruum is poured on top until completely covered the drug material. The container is then closed and kept for at least three days. We have taken 2 beakers, one beaker for Curcuma Longa and the second one for Thuja Occidentalis and 50- 50 gm of crude drugs are dissolved in 250 ml ethanol. Now after stirring cover the container (Beakers) and keep in room temperature for three days. The extract is filtered for any large particles and then collected.

Qualitative phytochemical analysis [9]

Qualitative analysis for various phytoconstituents in the dried powders and extracts all the raw materials were carried out using different reagents are mentioned below.

Results and Discussion

Physio-Chemical Constants

a) Ash value: The total ash usually consists of carbonate, phosphate and silicates.

i. Total ash: The total ash content of the raw materials were determined, taking sample from the collected materials calculated in table below

Table No. 2: Total ash value of raw material.

S. No.	Ingredients	Total ash (%w/w)	*Limits (%w/w)
1.	*turmeric*	9.3±1.8	Not more than 12
2.	*eastern white-cedar*	8.6±1.2	Not more than 15

ii. Acid insoluble ash: From the total ash, the acid insoluble ash content of the individual raw materials determined and results enumerated below

Table No. 3: Acid insoluble ash value of raw material.

S. No.	Ingredients	Acid insolubleash (%w/w)	*Limits (%w/w)
1.	*turmeric*	0.5±1.2	Not more than 0.6
2.	*eastern white-cedar*	1.4±1.5	Not more than 2.5

iii. Sulphated ash: Sulphated content of raw materials was determined, the values obtained and their acceptable limits defined are given in table.

b) Extractive values

i. Water soluble extractive: Water soluble extractive values for the raw materials in water were determined and the results were given in table below

Table No. 4. Water soluble extractive value of raw material.

S. No.	Ingredients	Water Soluble Extractive (%w/w)	*Limits (%w/w)
1.	*turmeric*	24.5±1.2	Not more than 25
2.	*eastern white-cedar*	17.4±1.5	Not more than 18

i. Alcohol soluble extractive: Alcohol soluble extractive values for the raw materials in ethanol 95% were determined and the results were given in table

Table No.5. Alcohol soluble extractive value of raw material.

S. No.	Ingredients	Alcohol Soluble Extractive (%w/w)	*Limits (%w/w)
1.	*turmeric*	09.5±1.2	Not more than 10
2.	*eastern white-cedar*	7.4±1.5	Not more than 8

ii. Ether soluble extractive: Ether soluble extractive values for the raw materials in ether were determined and the results were given in table

Table No. 6: Ether soluble extractive value of raw material.

S. No.	Ingredients	Ether Soluble Extractive (%w/w)	*Limits (%w/w)
1.	*turmeric*	2.5±1.2	Not less than 1
2.	*eastern white-cedar*	1.4±1.5	Not less than 4

a) Moisture content

i. Loss on drying: Loss on dry analysis in the raw materials were carried out and the results were recorded and results in Table

Table No. 7: Loss on drying value of raw material.

S. No.	Ingredients	LOD (%w/w)	*Limits (%w/w)
1.	*turmeric*	4.6	Not more than 15
2.	*eastern white-cedar*	6.3	Not more than 14

Extracts % yield [12]

The shade dried all plants materials raw were extracted in extractor by maceration methods with the universal solvent ethanol. All the extracts were concentrated using rotary vacuum evaporator. The percentage yield was calculated for every extract in terms of dried weight of plant materials. The colour and consistency of the concentrated extracts are given in table below.

Table No. 8: Percentage yield of extracts.

S. No.	Plant name	Solvent	Method ofextraction	Physical nature	Color	Yield (%w/w)
1.	**Turmeric**	Ethanol (95%)	Maceration	Semisolid	Dark yellow	5.65
2.	**Eastern white-cedar**				Dark green	5.7

Qualitative estimation of phytoconstituents [13]

i. Preliminary phytochemical analysis of raw materials

The raw material powders and all the extracts were subjected to qualitative phytochemical analysis to identify the various phytoconstituents present in it, as per the standard procedures.The results are given in the Table.

Table No. 9: Preliminary phytochemical analysis of raw materials.

Chemical constituents	*turmeric*		*eastern white-cedar*	
	Powder	Extract	Powder	Extract
Steroids	-	-	-	-
Glycosides	-	-	-	-
Phenols	+	+	+	+
Flavonoids	+	+	+	+
Tannins	+	+	+	+
Proteins	+	+	+	+
Alkaloids	-	-	-	+
Carbohydrates	+	+	+	+
Terpenoids	-	-	-	-
Fats and oils	-	-	+	+

+ indicates presence, - indicates absence

Table no. 10: Results for consistency of formulations.

S. No.	Formulation code	Greasiness
1	HG F1	No Greasiness
2	HG F2	No Greasiness
3	HG F3	No Greasiness
4	HG F4	No Greasiness

a) pH: The pH of formulation was found to be satisfactory and in the range of 5.6-5.8. It is near to the skin pH which indicates that the prepared formulation can be compatible with skin. The results are shown in table.

Table no. 11: Results for pH of formulations.

S. No.	Formulation code	pH
1	HG F1	6.8
2	HG F2	6.9
3	HG F3	7.1
4	HG F4	7.0

b) Wash ability: Prepared formulations were easily washed with water. The results are shown in table.

Table no. 12: Results for wash ability properties of formulations.

S. No.	Formulation code	Wash ability
1	HG F1	Easily washed
2	HG F2	Easily washed
3	HG F3	Easily washed
4	HG F4	Easily washed

c) Homogeneity: Under visual inspection of the prepared formulation indicated no lumps and to have uniform color dispersion, free from any fiber and particle. The results are shown in table.

Table no. 13: Results for homogeneity of formulations.

S. No.	Formulation code	Homogeneity
1	HG F1	Good
2	HG F2	Good
3	HG F3	Good
4	HG F4	Good

d) Extrudability: The prepared formulations show that good extrudability. The percent of the extruded gel was calculated (>90% extrudability: excellent, >80% extrudability: good, >70% extrudability: fair). The results are shown in table.

Table No. 14: Results for extrudability properties of formulations.

S. No.	Formulation code	Extrudability

1	HG F1	Good
2	HG F2	Good
3	HG F3	Good
4	HG F4	Good

e) Grittiness: The prepared formulation are shows no grittiness. The results are shown intable.

Table No. 15: Results for grittiness properties of formulations.

S. No.	Formulation code	Grittiness
1	HG F1	No Grittiness
2	HG F2	No Grittiness
3	HG F3	No Grittiness
4	HG F4	No Grittiness

f) Viscosity: Viscosities of formulated gels were determined using Brookfield viscometer given in table below.

Table No. 16: Results for viscosities of formulations.

S. No.	Formulation code	Viscosity(cp)		
		50 RPM	60 RPM	100 RPM
1	HG F1	3540	3080	2106
2	HG F2	4764	4030	2508
3	HG F3	3312	2960	2070
4	HG F4	4656	4070	2772

g) Spreadability: The spreadability studies showed that all formulations have betterspreadability.

h) Stability study [14]: During stability studies all formulation produces good results during 3 months and the results are shown in the table.

Table No. 17: Results for stability of formulations.

S. No.	Formulation code / Parameters	HG F1	HG F2	HG F3	HG F4
1	Color	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green
2	Odor	Pungent	Pungent	Pungent	Pungent
3	pH	No change	No change	No change	No change
4	Spreadability	Good	Good	Good	Good
5	Viscosity	No change	No change	No change	No change

Conclusion

The phytochemical constant was carried out for the plants powder and extracts of turmeric and eastern white-cedar to bring the quality and purity of the valuable medicinal plants. Preliminary phytochemical screening was carried out for all the plants and its extracts to determine the presence of active principle in plants.

Selected plants powder were extracted with ethanol to bring all the active principle, Qualitative estimation of total flavonoid content and total Phenolic content were determined by spectrophotometrically all the extract showed significant amount of flavonoid and phenolic compounds.

Poly herbal gel was prepared with water soluble polymer Carbopol 934, to bring a good absorption capacity of the plant extracts for topical drug delivery.

In this study, the semisolid preparations containing an ethanolic extract of the polyherbal gel used in treating skin disease were prepared and characterized. For phytochemical analysis, the total content of phenolic compounds, which were used as bioactive markers in this study, as well as the total flavonoid content was investigated. The standardization parameters of the gel such as viscosity, pH, Homogeneity, Spreadability, content uniformity, was carried out to bring a quality, purity and safety of the prepared Herbal gel formulation. Based on the evaluation parameters HG 1 found to be more stable and optimized among all Formulations.

In all terms gels were found to be optimal. Thus, these can be further evaluated for Phytochemical analysis and In vitro and In vivo animal models against skin disease.

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Conflict of interest

No Conflict of interest

Informed Consent

Not Required

Ethical Statement

Not required.

Author contribution

All authors are contributed equally.

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