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Formulation Development and Evaluation of Herbal Gel Containing *Smilax China L.* Extract for Topical Treatment of Acne

Anjali Khantal *[1] , Dr. S.C. Mahajan[1] , Saurabh Sharma*[2] , Pranay Sethiya[2] , Harshita Sharma*[3]
M.Pharma , Mahakal Institute of Technology Ujjain,
RGPV Bhopal , India

***Abstract*:- In Present work carried out for Formulation Development and Evaluation of Herbal Gel Containing *Smilax China* Extract for Topical Treatment of Acne. *Smilax China L.*use in treatment of Energy tonic, impotency and seminal disorders, chronic arthritis and secondary and tertiary syphilis, schizophrenia and epilepsy, pemphigus and skin diseases, ostero-arthritis, leucorrhea or white discharge, relieving joint numbness, diabetes , antimicrobial activities of Smilax china, a medicinal plant that has traditionally been used as an antimicrobial and anti-inflammatory agent, were investigated against microorganisms commonly involved in acne inflammation, such as *Propionibacterium acnes, Staphylococcus epidermidis* and *Staphylococcus aureus*.**

Keywords* : *Smilax china* , *Propionibacterium acnes* , *Antimicrobial

1.INTRODUCTION

1.1 Acne

Acne is considered as one of the most widespread skin diseases[1]. *Acne vulgaris* is the second uppermost reason of suicide among skin diseases. When a person suffering from acne is compared with an individual who is not suffering from acne than it is found that the former has higher level of anxiety, more socio inhibition and has more aggressiveness[2]. This disease occurs in both male and female; there is no preference among them, but the course is more severe in males[3].

2. PLANT PROFILE :

Smilax china L., also known as Jin Gang Ten, is a tiny vine that grows in the southern portions of China and has a long history of indigenous usage in China. Fat, saponins, glucosides, gum, starch, flavonoids, tannins, and alkaloids make up *S. china.* Because it contains beneficial components such as triterpenoid, saponins, flavones, stilbenes, and organic acids, *S. china* has been utilized in traditional Chinese medicine**.**Chemical Constitutions *S. china* consists of fat, saponins, glucosides, gum, starch, flavonoids, tannins and alkaloids Uses : Energy tonic, impotency and seminal disorders, chronic arthritis and secondary and tertiary syphilis, schizophrenia and epilepsy, pemphigus and skin diseases.

3. EXPERIMENTAL WORK

3.1 Procurement of Plant Material: In the month of February 2021, root of *Smilax china* L. was obtained from a local market in Bhopal. After the plants were harvested, they were cleaned to prevent the phytochemicals found in the plant from deteriorating.Cleaning :Following the acquisition of plant material, they were thoroughly cleaned[4]. The cleaning procedure was broken down into the following phases.Drying :Plant material was maintained for drying in the sun but in the shade shortly after washing[5].Powdering :The dried plant material was finely ground with an electric grinder, sieved, and stored in plastic bags until neededExtraction procedure: Extracts from shade dried and powdered herbs were prepared according to the following procedure[6]. Plant Material Defatting:The maceration technique was used to extract the shade dried root of Smilax china using petroleum ether.Extraction by maceration method .A hydroalcoholic solvent was used to extract the root (ethanol: water: 80:20). The maceration technique was used to extract the powdered root (62.4 gram) (Mukherjee, 2007). To get the dry concentrated extract, the resulting content was filtered using Whatman filter paper no. 1 and retained for solvent evaporation. The extractive yield was calculated by weighing the dried crude concentrated extract, which was then transferred to glass vials (6 2 cm) and kept in a refrigerator (4°C) until needed for analysis[7]. Determination of extractive value (% yield)

$$\textbf{percentage Yield} = \frac{\text{Weight of extract}}{\text{Weight of powdered drug taken}}$$

3.2 Qualitative phytochemical analysis

Preliminary phytochemical screening is crucial for determining the profile of a particular extract in terms of the chemical compounds generated by the plant[8].

1. Detection of alkaloids-Hager's Test: Hager's reagent was used to treat the filtrates (saturated picric acid solution). The presence of alkaloids was verified by the appearance of a yellow-colored precipitate.

2. Detection of carbohydrates-Fehling's Test: Filtrates were hydrolyzed in dilution HCl, neutralized with alkali, and heated in Fehling's A and B solutions. The presence of reducing sugars is shown by the formation of red precipitate.

3. Detection of glycosides-Legal's Test: Sodium nitropruside in pyridine and sodium hydroxide were used to treat the extracts. The presence of cardiac glycosides is indicated by the presence of a pink to blood red color.

4. Detection of saponins-Froth Test: The extracts were diluted to 20ml with distilled water and agitated for 15 minutes in a graduated cylinder. The presence of saponins is indicated by the formation of a 1 cm layer of foam.

5. Detection of phenols-Ferric Chloride Test: 3-4 drops of ferric chloride solution were added to the extracts. The

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presence of phenols is indicated by the formation of a blue black color.

6. Detection of flavonoids-Lead acetate Test: A few drops of lead acetate solution were added to the extracts. The presence of flavonoids is shown by the formation of a yellow-colored precipitate.

7. Detection of proteins-Xanthoproteic Test: A few drops of concentrated nitric acid were added to the extracts. The presence of proteins is shown by the formation of a yellow color.

8. Detection of diterpenes-Copper acetate Test: 3-4 drops of copper acetate solution were added to the extracts after they were dissolved in water. The presence of diterpenes is indicated by the formation of emerald green color [66-68].

3.3 Formulation development of herbal gel

3.3.1 Method of preparation

In a beaker, measured amounts of methyl paraben, glycerin, polyethylene glycol, and Smilax china hydroalcoholic extract were dissolved in roughly 35 ml of water and swirled at high speed using a mechanical stirrer (or sonicator)[36]. Then, while stirring, Carbopol 940 was gently added to the beaker containing the aforementioned liquid[9]. The solution was neutralized by progressively adding triethanolamine solution while stirring constantly until the gel was formed [7].

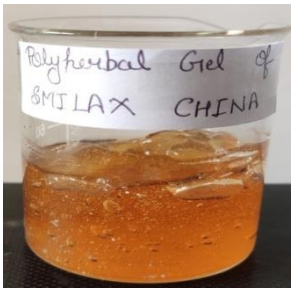

Figure 3.1: Prepared herbal gel of *Smilax china* extract

3.3.2 Evaluation of herbal gel

Appearance and consistency: The physical appearance of herbal gel formulations was visually examined for texture, and observations[10] .Washability: Formulations were applied to the skin, and then the ease and extent of washing with water were physically evaluated, with results. Extrudability determination of formulations The tubes were pushed to extrude the material, and the formulation's extrudability was tested by Benoy[7].

Determination of Spreadability

$$\text{Spreadability} = \frac{\text{m.l}}{\text{t}}$$

Determination of PH A digital pH meter was used to determine the pH of the herbal gels[11].

Media preparation (broth and agar media)

Composition of nutrient agar media

Agar	1.5 gms.
Beef extract	0.3 gms.
Peptone	0.5 gms.
Sodium chloride	0.55 gms.
Distilled water	to make 100 ml.
pH – 7	

Method of preparation

This agar media was dissolved in distilled water and then heated in a large conical flask. Dry components are placed in a flask with the necessary amount of distilled water and heated to thoroughly dissolve the medium[12]. The flask holding the medium was cotton capped and sterilized at 15 lbs/inch^2 (121^{o}C) for 15 minutes in an autoclave. The media in the flask was immediately poured (20 ml/plate) into sterile petri dishes on a level surface after sterilization. The poured plates were allowed to harden at room temperature before being incubated at 37°C overnight to ensure sterility[13]. Before usage, the plates were dried at 50°C for 30 minutes[34].

4. RESULTS AND DISCUSSION

The goal of this study was to demonstrate preliminary chemical screening, antibacterial activity, gel formulation creation, and *Smilax china* antimicrobial activity.

4.1 Results of Extractive Values: Hydroalcoholic solvent was used to extract the root of *Smilax china*.

Table 4.1: Extractive values of extracts of *Smilax china*

S. No.	Solvents	Colour	Physical nature	% Yield (W/W)
1	Pet. ether	Sticky brown	Solid	1.65
2	Hydroalcoholic	Dark brown	Solid	3.47

4.2 Result of Phytochemical Screening: Phenol, flavonoids, alkaloids, and secondary metabolites are phytochemical components with nutritional and pharmacological properties.

Table 4.2: Result of Phytochemical screening of *Smilax china*

S. No.	Constituents	Hydroalcoholic extract
1.	**Alkaloids** Hager's Test:	+ve
2.	**Glycosides** Legal's Test:	+ve
3.	**Flavonoids** Lead acetate Test:	-ve
4.	**Diterpenes** Copper acetate Test:	-ve
5.	**Phenol** Ferric Chloride Test:	+ve
6.	**Proteins** Xanthoproteic	+ve

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	Test:	
7.	**Carbohydrate** Fehling's Test:	+ve
8.	**Saponins** Froth Test:	+ve

4.4 Results of evaluation of gel formulation - Colour- Dark Brown , Clogging- Absent , Homogeneity- Good , Texture – Smooth. **Results of washability and extrudability –** Good washability and Averange extrudability.**Results of spreadability** - Spreadability (gcm/sec) 15.63±10.35.**Determination of pH –** Averange PH is 7.0±0.2. **Results of Viscosity –** Averange Viscosity is 2867±15.**Results of antiacne activity of extract and herbal gel** The herbal gel produced from the plant was diluted to concentrations of 100, 50, and 25 mg per ml before being administered to the test organism through the well diffusion method[10]. When compared to extract, the formulation HG5 showed greater antiacne efficacy[21].

Table 4.3: Antiacne activity of extract and herbal gel formulation (HG5) against *Propionibacterium acnes*

S. No.	Extract /Formulation	Zone of inhibition (mm)		
		100mg/ml	50 mg/ml	25mg/ml
1.	Extract	18±0.5	15±0.47	13±0.86
2.	Herbal gel	17±0.74	13±0.57	10±0.86

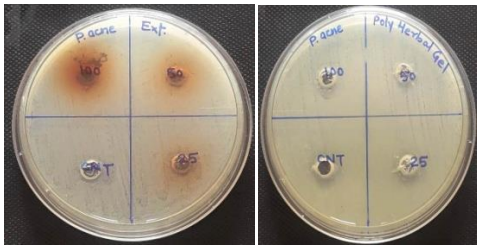

Figure 4.2: Photoplates of Anti-acne activity of extract and herbal gel formulation against *P. acnes*

As mentioned, zone of inhibition of *Smilax china* hydoalcoholic extract (Extract 18±0.5, 15±0.47, and 13±0.86) and (Herbal gel 17±0.74, 13±0.57, 10±0.86) observed when hydralcoholic extract of *Smilax china* incubated with *P. acnes* respectively.

8. SUMMARY AND CONCLUSION:

Herbal remedies from nature are well-researched and shown to be effective and safe natural treatments for a wide range of ailments. The goal of this study was to demonstrate preliminary chemical screening, antibacterial activity, gel formulation creation, and *Smilax china* antimicrobial activity. The dried root was thoroughly cleaned under running tap water before being ground with an electric grinder. The powder was extracted using a hydroalcoholic extract solvent and the maceration technique[16]. The phytochemical screening of *Smilax china* extract was one of the standardization criteria that were examined. which clearly indicates the anti-acne action of the herbal gel against the *Propionibacterium acnes* strain employed in this study. The herbal gel produced from the plant was diluted to concentrations of 100, 50, and 25 mg per ml before being administered to the test organism through the well diffusion method. Due to its minimal diffusion, high spreadability, neutral pH, and low viscosity, the produced gel formulation was determined to be suitable for topical application[15]. When compared to extract, the formulation HG5 showed greater antiacne efficacy. It can be used to treat acne without causing harm.

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