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FORMULATION & EVALUATION OF GEL CONTAINING *CAMELLIA SINENSIS* OIL FOR TREATMENT OF BURN SKIN

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Abstract :-

Burns is a tissue damage caused by contact with hot objects, chemical electrical and radiation. Damage caused by burns can come to the subcutaneous tissue, dermis and epidermis depends on the length of exposure to the causative factor. Burns are usually expressed by degrees, depending on the extent of tissue damaged by burns proficiency level. In recent time the Gel based drug delivery systems are being employed for therapeutic effectiveness of topical applied drugs. *Camellia sinensis* is traditionally showed anti microbial, anti-inflammatory agent, analgesic & anti-oxidative properties. Topical route for *Camellia sinensis* oil extract gel was selected up to avoid GIT irritation and to maximize the drug concentration at the site of action. The *Camellia sinensis* extracted oil gel are prepared by using different conc. of Carbopol 940. From the result it is concluded that all the gel formulation showed good appearance and homogeneity. The physical appearance of the gel formulation yellowish brown in nature. The pH of gel formulation was in the range of 6.8, which lies in the normality pH of skin and with time no skin irritation was observed by small amount odd shear diameter after 1 min of herbal gel was between 37 mm which indicate good spread ability of herbal gel. The result showed that *Camellia sinensis* oil extract for formulation of burning gel was better than the effect of the other gel.

Key words:- *Camellia sinensis*, Carbopol 940, herbal gel & burn

1. Introduction :-

Burns is a tissue damage caused by contact with hot objects, chemical electrical and radiation. Damage caused by burns can come to the subcutaneous tissue, dermis and epidermis depends on the length of exposure to the causative factor. Burns are usually expressed by degrees, depending on the extent of tissue damaged by burns proficiency level. At burns, body fluids such as water and serum will be out. This condition is a good medium for microbial growth. Natural products from plants are under immense consideration in the organic world. One such utilization is of essential oils that are complex volatile compounds extracted from leaves, twigs, flowers, seeds, branches, buds, fruits, and roots. These secondary compounds are then stored in secretory cells, glandular trichomes, canals, cavities, and epidermal cells. Use of essential oils (EOs) is expeditiously increased because

of their antibacterial, antiviral, antifungal, insecticidal, anti-inflammatory, and antimicrobial traits. *Camellia sinensis* (tea tree) oil is an essential oil traditionally used to treat wounds, burns, and other skin infections. *Camellia sinensis* oil, also known as melaleuca oil, is an essential oil with a fresh, camphoraceous odour and a colour that ranges from pale yellow to nearly colourless and clear. It is derived from the leaves of the tea tree, *melaleuca alternifolia*, native to southeast Queensland and the northeast coast of New South Wales, Australia. It produces calm in redness, swelling, and inflammation. It may even help to prevent and reduce burn marks, leaving you with smooth, clear skin. A gel is a solid or semisolid system of at least two constituents, consisting of condensed mass enclosing and interpenetrated by a liquid. Gels are composed of solid dispersed in small amount in relatively large amount of liquid, they possess more solid-like than liquid-like composition. The aim of present study is to provide a comprehensive overview of the beneficial effects of *Camellia sinensis* on skin diseases like burn. Peer-reviewed articles on the potent dermatological effects of *C. sinensis* were acquired from PubMed, Web of Science, Scopus, Science Direct, and Scifinder. This review confirms the potent dermatological effects of *Camellia sinensis*.

2. Material & method :-

2.1 Plant & chemical selection & collection:- Selection of plant was based on traditional claim of medicines. Plant material was collected from local market in Indore. Carbopol 934 and Carbopol 940 were obtained from Loba Chem. Pvt Ltd, Mumbai. Methyl paraben sodium and propyl paraben were obtained from Hi Media laboratories. Glycerol and triethanolamine were obtained from Nice chemicals Pvt. Ltd, Mumbai. Plant and all the chemicals were authenticated.

2.2 Extraction Method:- Essential oil was extracted from hydro-distillation technique at Sri Aurobindo Institute of Pharmacy. The unit consisted of a distillation flask/tank, condenser, and thermometer. About 8–10 kg of plant material was added in flask and submerged into 12 L of water. Then, the set up was airtightly closed, and the process was started at 250 °C temperature. The procedure continued for 4–5 h. Oil was collected in a separating funnel. The %age yield of the extracted oil (v/w) was calculated by the following formula, and then the oil was stored at a cool dry place. Essential Oil Yield % = $\frac{\text{Volume of extracted oil}}{\text{Fresh weight of plant material (g)}} \times 100$.

2.3 Animals:- A total of 78 were taken. 12-week old healthy Wistar strain rats weighing 150–200 g of either sex, bred locally in the animal house were selected for the wound healing studies and 9 albino rabbits (average wt. 2.2 kg) were used for primary skin irritation test.

They were housed under controlled conditions of temperature (23-2) humidity (50-5) and 10-14 hours of light and dark cycles. The animals were housed individually in polypropylene cages containing sterile paddy husk bedding and free access to food and water ad libitum. The study was conducted after obtaining the approval from Institutional Animal Ethical Committee.

2.4 Study Design:-

- **Wound healing studies of extract:-** Rats were anaesthetized with ketamine xylazine (50 mg/kg+5mg/kg) and the hair on the back was clipped with electric clippers. Burn wounds were created by using a device with an iron piece and a wooden handle placed on the back of the rat. It was heated to red hot over flame and was placed in contact with the back of anaesthetized rat up to 10 seconds without any pressure. After this, each animal was placed in a separate cage for full recovery from anesthesia before being returned to holding rooms. Extract were applied on the burn wound of test animal on control group I and control group 2 were left untreated. The application was repeated daily .

(1) Epithelization period: It was monitored by noting the number of days required for scar to fall away, leaving no raw wound behind;

(2) Wound contraction: To monitor this, progressive changes in wound area were followed planimetrically. Leaving the wounding day, wounds were traced on a transparent paper on an alternate day. The animal was restrained in proper position during tracing. The tracings were then transferred to 1 mm² graph sheet. From this, wound areas were read and the percentage of wound contraction was calculated taking the initial size of wound (250 mm²) as 100%.

The animals were randomly allocated into 2 groups of 6 animals each for the wound healing studies of the extract and 2 groups of six animals each for the wound healing studies of the gel formulation as follows-

a. **For burn healing studies of extract:-**

Group I: treated group with *Camellia sinensis* oil extract

Group II: untreated group

b. **For wound healing studies of the formulation**

Group I: A1 treated with gel formulation of 4% *Camellia sinensis* oil extract with 1% Carbopol 934;

Group II: A2 treated with gel formulation of 4% of *Camellia sinensis* oil with

1.5% Carbopol 934;

Group III: A3 treated with gel formulation of 4% Camellia sinensis oil extract with 2% Carbopol 934;

Group IV: A4 treated with gel formulation of 4% Camellia sinensis oil extract with 2.5% Carbopol 934;

- **Formulation of gel:-**

Four different formulations were prepared using different concentration of Carbopol 934 and Carbopol 40. The gel was prepared using Camellia sinensis oil extract. The gel was prepared using carbopal-940, propylene glycol 400, methanol methyl paraben, propylparaben, EDTA, Tri ethanolamine and distilled water in a quantity sufficient to prepare 100g of gel in case of blank gel. Water required for this formulation was divided into two parts. In one part the exact amount of extract was dissolved and to this calculated quantity of propylene glycol 400 and ethanol was added. In other part Carbopol 940 was dissolved and this solution methyl paraben, propyl paraben and EDTA was added. Both of these solutions were mixed on a beaker and tri ethanol amine was added to the mixture drop wise to obtain the gel consistency.

2.5 Evaluation of the gel:

1. **Estimation of drug content:** Each formulation (1 g) containing approximately 40 mg of drug was taken in a 50 mL volumetric flask and diluted with ethanol and shaken to dissolve the drug in ethanol. The solution was filtered through Whatman filter paper; 0.1 mL of the filtrate was pipette out and diluted to 10 mL with ethanol. The content of the drug was estimated spectrophotometrically by using standard curve plotted at 270 nm (λ max of extract). The gel formulations were observed for their visual appearance, transparency and homogeneity.
2. **Extrudability:** A closed collapsible tube containing about 20 g of gel was pressed firmly at the crimped end and a clamp was applied to prevent any rollback. The cap was removed and the gel was extruded until the pressure was dissipated.
3. **pH measurements:** pH measurements of the gel were carried out using a digital pH meter by dipping the glass electrode completely in to the gel system to cover the electrode.
4. **Viscosity:** Viscosity of the gels was determined using Brookfield viscometer (Spindle type, S-24; model LVDV-E) at 10 rpm. 200 g of the gel was taken in a

beaker and the spindle was dipped in it for about 5 minutes and then the reading was taken.

5. **Spread ability:** Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 7.5 cm along the slide. 100 g weight was placed upon the upper slides so that the gel between the two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of gel adhering to the slides was scrapped off. The two slides in position were fixed to a stand without slightest disturbance and in such a way that only the upper slide to slip off freely by the force of weight tied to it. A 20 g weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 7.5 cm and separated away from the lower slide under the influence of the weight was noted.
6. **Skin irritation test:** Test for irritation was performed in human volunteers. For each formula, five volunteers were selected and 0.1 g of formulated gel was applied on an area of 2 square inch.

3. RESULT:-

1. Wound healing effect :

Treatment (n=6)	% of wound contraction (mean± SD)					Epithelization time(days)
	Day 4	Day 8	Day 12	Day 16	Day 20	
Camellia sinensis oil extract	5.25±1.36	28.60±2.13	58.10±3.69	87.10±1.88	95.53±2.37	23.00±2.43
Untreated control	2.90±1.21	12.40±0.92	24.20±0.81	34.25±1.29	54.51±2.03	40.00±1.06

Table 1: Wound healing effect of *Camellia sinensis* oil extract in burn wound model.

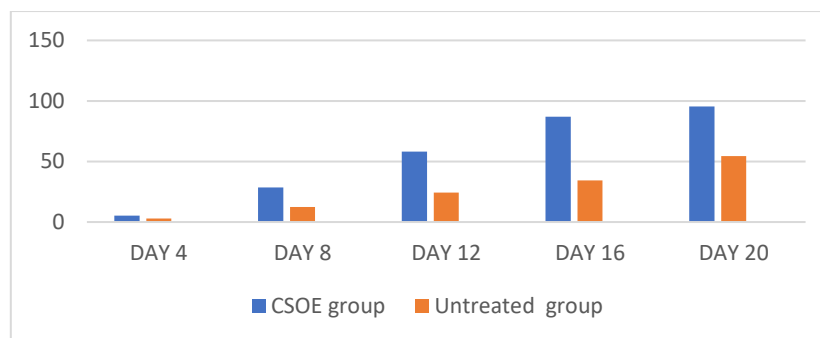


Fig. 2 Wound healing effect of *Camellia sinensis* oil extract in burn wound model.

2. Gel Evaluation Characteristics:-

S. No	Formulation	pH	Viscosity	Spread-ability	Drug content % w/w	Extrudability	Nature of gel
1.	A1	6.8	32170	37.52	93.26	+++	Yellowish brown transparent, homogenous
2.	A2	6.9	48240	25.45	101.97	+++	Yellowish brown transparent, homogenous
3.	A3	6.4	53180	22.123	89.47	+++	Yellowish brown transparent, homogenous
4.	A4	6.5	64250	18.47	97.86	++	Yellowish brown transparent, homogenous

Table 2: Characteristics of herbal gel consist of *Camellia sinensis* oil extract

The *Camellia sinensis* extracted oil gel are prepared by using Carbopol 940 composition of herbal gel table.2. From the result it is concluded that all the gel formulation showed good appearance and homogeneity. The physical appearance of the gel formulation Yellowish brown in nature. The pH of gel formulation was in the range of 6.8, which lies in the normality pH of skin and with time no skin irritation was observed by small amount odd shear diameter after 1 min of herbal gel was between 37 mm which indicate good spread ability of herbal gel. The result showed that *Camellia sinensis* oil extract for formulation of burning gel was better than the effect of the other gel.

4. CONCLUSION:-

In recent time the Gel based drug delivery systems are being employed for therapeutic effectiveness of topical applied drugs. *Camellia sinensis* is traditionally showed anti microbial , anti-inflammatory agent, analgesic & anti-oxidative properties. Topical route for *Camellia sinensis* oil extract gel was selected up to avoid GIT irritation and to maximize the drug concentration at the site of action. The transdermal delivery of the drug is limited

by the barrier properties of the skin that needs inclusion of penetration enhancers in the formulation. In the present study were made to formulate and evaluate herbal gels of *Camellia sinensis* oil extract for treatment of burn wound and infection . The developed herbal burn gel consisting of *Camellia sinensis* oil extract found to safe and effective for treatment of skin burn. It is inferred from results that gel formulation are good in appearance, homogeneity and easily spread a lead shower good effect on burn skin. Because *Camellia sinensis* oil extract are both considered good for healing of burns. *Camellia sinensis* oil extract gel appears to be a safe complementary modality in the treatment of these common burn infection. In decreasing the healing time, the use of this oil can improve patient satisfaction.

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