FORMULATION AND EVALUATION OF WHEATGRASS TOPICAL GEL

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ABSTRACT

Topical delivery system of wheatgrass gel was formulated using Carbopol 940. The gel was evaluated for various physicochemical parameters like physical appearance, pH, homogeneity and viscosity.

Key Words: Topical Gel, Triticum aestivum, Wheat, chlorophyll

INTRODUCTION

Gels are transparent to opaque semisolids, containing gelling agent that merges or entangles to form a three-dimensional colloidal network structure. It is responsible for gel resistance to deformation and its visco-elastic properties. Gels have better potential as a vehicle to administer drug topically in comparison to ointment, because they are non-sticky, requires low energy during formulation, are stable and have aesthetic value. Drugs which are in use presently for the management of pain and inflammatory conditions are either narcotics e.g. opioids or non-narcotics e.g. salicylates and corticosteroids e.g. hydrocortisone. All of these drugs present well known side and toxic effects. Moreover synthetic drugs are very expensive to develop since, for the successful introduction of a new product approximately 3000 - 4000 compounds are to be synthesized, screened and tested, whose cost of development ranges from 0.5 to 5 million dollars. On the contrary many medicines of plant origin had been used since long time without any adverse effects. It is therefore essential that efforts should be made to introduce new medicinal plants to develop cheaper drugs. Plants represent a large untapped source of structurally novel compounds that might serve as lead for the development of novel drugs.

Wheat, (Triticum species) a cereal grass of the Gramineae (Poaceae) family, is the world's largest edible grain cereal-grass crop. It is commonly 60-150 cm. in height, but
may be as short as 30 cm. stem is tufted, erect or semi-erect to prostrate, generally hollow with thin walls, in stem nodes are present generally 5-7 at 3-4 cm. leaves are long and narrow having glabrous or hairy on one or both surface.[12],[13]

Scientific reports on nutritional analysis of wheatgrass have been published frequently in various journals.[14],[15],[16] These reports and the chemical analyses undertaken reveal that wheatgrass is rich in chlorophyll, minerals like magnesium, selenium, zinc, chromium, antioxidants like beta-carotene (pro-vitamin A), vitamin E, vitamin C, antianemic factors like vitamin B_{12}, iron, folic acid, pyridoxine and many other minerals, amino acids and enzymes, which have significant nutritious and medicinal value.[12]

Wheat grass contains chlorophyll. Chlorophyll solutions provide significant relief of pain, reduction of inflammation, and the control of odor for patients with serious mouth diseases, used successfully to treat chronic and acute sinusitis, vaginal infections, and chronic rectal lesions.[17]

Therefore, the present study was conducted to formulate a suitable topical wheatgrass gel formulation using Carbopol 934. The prepared gel was evaluated for appearance, pH and viscosity.

MATERIALS & METHODS

Materials

A certified sample of *Triticum aestivum* was acquired from Wheat Research Center, Gujarat Krushi University, Junagadh, Gujarat. The authenticity of this certified sample was also confirmed by comparing its morphological characters with the description mentioned in different standard texts and floras.[18] This wheat variety was grown in plastic trays as per the standard procedure described below.[19]

Procedure for growing wheatgrass[11]

♣ Adequate quantities of unpolished wheat grain were soaked overnight in water in a container.

♣ On the next day, the soaked wheat-grain were spread on the surface of the soil filled in plastic trays. Care was taken so that the grains did not touch one another.
A thin layer of soil was sprinkled on the wheat grains and then tray was covered with a newspaper to provide darkness, which helps sprouting.

The tray was kept in a covered balcony. Next day, the tray was uncovered to spray on some water and was covered again with the newspaper.

Previous step was repeated everyday until sprouting took place, after which the tray was left uncovered and watered everyday for 8 days.

On 9th day the wheatgrass was harvested by cutting it with a clean pair of scissors about 1/2” above the surface of the soil.

**Chemicals**

Carbopol 940 and sodium alginate (Astron chemicals), propylene glycol (Merck chemicals), glycerin (Oxford chemicals Ltd.), sodium hydroxide (Seva Chemicals), methyl paraben (Oxford chemicals Ltd.), eucalyptus oil (Chiti-chem Corporation), malachite green (Oxford chemicals Ltd.) etc., were used for preparation of gel.

**Methods**

**Preparation of wheatgrass gel:**

The grass was harvested after 8 days from sprouting and shade-dried in well-ventilated dark rooms for 4 days. Dried wheatgrass was powdered in a mill. The crushed wheatgrass was completely exhausted by adding small quantities of methanol and filtering off every time in a successive manner. This extract was evaporated to dryness at 35°C to remove methanol. Similarly successive extraction was also done. In successive extraction, crushed wheatgrass was exhausted by adding small quantities of petroleum ether few times and filtering off every time in a successive manner. Filtrate was evaporated to remove petroleum ether and residues were again exhausted by adding acetone few times. Here also filtrate was evaporated and residues were exhausted with methanol and then after with water and each time filtrate was evaporated. Here powder obtained in successive extraction from petroleum ether, acetone, methanol and water were combined and used for preparation of gel.
Development of gels: The gels were prepared with varying amount of the Carbopol 940 polymer on trial and error bases. The required amount of Carbopol 940 was added in to distilled water with vigorous stirring and left for overnight for proper dissolving of the polymer. The required amount of wheatgrass extract obtained after successive extraction was dissolved in the co-solvent mixture of alcohol and propylene glycol. Required quantity of methyl paraben as a preservative was also added into this mixture. This mixture was slowly dispersed in the Carbopol 940 dispersion with vigorous mixing at 300 rpm. The beaker was covered with aluminium foil and left mixing for approximately 15 minutes. The mixture was also homogenised with a homogenizer for 5 minutes at low speed. After complete addition of the polymer and proper mixing, the pH was adjusted at 7 with the addition of sodium hydroxide 1% solution and gels were spontaneously formed. To this gel required amount of glycerin and perfume (Eucalyptus oil) and colorants was added. The gel was left at room temperature to set and to allow the air bubbles produced by the mixing to escape from the gel by putting on ultrasonicator for 15 min.

**TABLE 1: FORMULATION DATA FOR WHEATGRASS GEL**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbopol 940</td>
<td>1 g</td>
</tr>
<tr>
<td>Wheatgrass Extract (Combined extract obtained in successive extraction)</td>
<td>4.83 g</td>
</tr>
<tr>
<td>Co-solvent mixture</td>
<td>20 ml</td>
</tr>
<tr>
<td>Glycerin</td>
<td>15 ml</td>
</tr>
<tr>
<td>Sodium Hydroxide Solution (1%)</td>
<td>q.s.</td>
</tr>
<tr>
<td>Methyl paraben</td>
<td>0.5 g</td>
</tr>
<tr>
<td>Eucalyptus oil</td>
<td>q.s.</td>
</tr>
<tr>
<td>Malachite Green</td>
<td>q.s.</td>
</tr>
<tr>
<td>Distilled water up to</td>
<td>100 g</td>
</tr>
</tbody>
</table>

Evaluation of formulated gels: Prepared wheatgrass gel was evaluated for appearance, pH and viscosity. The gel was visually inspected for clarity, colour homogeneity, presence of particles and fibers.

Appearance:
The wheatgrass gel was greenish transparent in colour.

**Figure 1**
Topical Gel of Wheatgrass (*Triticum aestivum*)

**Measurement of pH:**
The pH of gel formulation was determined by using digital pH meter. One gram of gel was dissolved in 100 ml distilled water and stored for two hours. The measurement of pH was done in triplicate and average values are calculated.

**Viscosity study:**
The measurement of viscosity of the prepared gel was done with a Brookfield Viscometer. The gels were rotated at 50 rotations per minute. At each speed, the corresponding dial reading was noted. The viscosity of the gel was obtained by multiplication of the dial reading with factor given in the Brookefield Viscometer catalogues.

**RESULTS**
The various parameters evaluated for gels are represented in Table 2.

**Table 2: Quality Control Data for Wheatgrass Gel**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity</td>
<td>Good</td>
</tr>
<tr>
<td>pH</td>
<td>6.8</td>
</tr>
<tr>
<td>Viscosity</td>
<td>18523 cps</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>good</td>
</tr>
</tbody>
</table>
DISCUSSION
Wheatgrass has been traditionally used, since ancient times, to treat various diseases and disorders. Topical application of wheatgrass juice has been recommended for treatment of skin diseases. So, in the present study we formulated a gel formulation of wheatgrass for treatment of skin diseases, using carbopol 940. The gel was evaluated for various physicochemical parameters like clarity, pH, viscosity and homogeneity.

CONCLUSION
Wheatgrass topical gels was developed using carbopol 940. The gel showed good physico-chemical properties.

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REFERENCES


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