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Formulation and Evaluation Pharmaceutical Aqueous Gel of Powdered Cordia Dichotoma Leaves With Guava Leaves

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ABSTRACT

Species of the genus Cordial, Boraginaceae, are widely studied with regard to the formulation of herbal aqueous gel with using guava leaves extract. Herbal medicines is still the mainstay of about 75-80% of the world's population, mainly in developing countries, for primary health care because of better compatibility with human body, cultural acceptability and lesser side effects. They are found principally in tropical and subtropical regions of the India, American and African continents, where they occur in various countries. The objectives of present investigation were to formulate and evaluate herbal gel for mouth ulcer treatment of dried powdered of Cordial. All species of the genus Cordial, Boraginaceae, are widely studied with regard to the various Cordial dichotomy, guava leaves and Carbopol 934, Propylene glycol as a gel base. Formulations were evaluated for various parameters like physical appearance, pH, homogeneity, spreadability, viscosity, extrudability. The formulated gel was transparent, homogeneous and pH ranges from 7 to 7.5. Formulation showed acceptable rheological behavior with applicable spreadability and extrudability properties. Present herbal formulation was developing with very safe with good stability and effective over to synthetic formulations for the treatment of mouth ulcer. This research work give to information reported in this work contributes scientifically to recognizing the importance of the genus Cordial and guava as a target in the search for new biotechnological investments and herbal formulation.

Keywords: Cordial, herbal formulation, guava, herbal gel.

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INTRODUCTION

Gels are typically semi-solid formulations having a liquid phase that has been thickened with other components. (Auta J 2007) Demand for medicinal plants is increasing in both developing and developed countries. Research on medicinal plants is one of the leading areas of research globally. World Health Organization (WHO) has defined herbal medicines are finished, labeled medicinal products that contain active ingredients, aerial or underground parts of the plants or other plant material or combination. Uses of topical gel preparations are for skin application or percutaneous penetration of medicament or local action to certain mucosal surfaces (Singh, 2014). A mouth ulcer is a break or breach in the mucous membrane, which is lines the inside of the mouth. It usually has yellow or white color and usually looks like a depression in mouth that is the mucous membrane. (Dosani, 2011) The Commercially available gels containing synthetic and semi synthetic active agents which have several disadvantages like staining on the teeth, irritation, and burning sensation only because presence of high degree of alcohol content and some organic compounds. The present investigation deals with use of herbal powdered Guava Leaves in the treatment of mouth ulcer in pharmaceutical gel. Commonly known as guava, Peru, Ambrud. A biological source is Sodium guava belongs to family Myrtaceae. Chemical composition contains Flavonoids, Triterpenoids, Steroids, Carbohydrates, Oils, Lipids, Glycosides, Alkaloids, Tannins and Spooning. Used as Antioxidant, Antibacterial activity, Anti-inflammatory activity, anticancer activity (Wang, 2014). Importance of herbal medicine has both medicinal and economical. Although herbal medicines has benefits to increased, their safety, efficiency, quality and importance of industrialized and developing countries. Herbal medicines are getting increasing patient compliance as they are avoiding typical side effects of allopathic medicines. It is no wonder that the world's one-fourth population i.e. 1.42 billion people, are dependent on traditional medicines for the treatment of various diseases. Medicinal plants have been a major source of cure for human diseases since time immemorial. Recently considerable attention has been paid to utilize bio-friendly and eco-friendly plant based products for the cure and prevention of different diseases, so it is documented that most of the World's population has taken in traditional medicine. The India offers a variety of plants having medicinal properties. Medicinal plants can be use to find out effective alternative to synthetic drugs (Jadhav, 2015). The use of the medicinal plant based medication is gradually becoming popular throughout the world. Near about half of the worlds, twenty five bestselling pharmaceutical innovator agents are derived from natural products (Das, 2011). The use of medicinal plants as raw materials in the preparation of new drugs is ever

increasing because of their potentials and the problem of drug resistance in micro-organisms. Demand for medicinal plants is increasing in both developed and developing countries. Research on herbal medicinal plants is one of the leading areas of research globally (Divedi, 2012).

Herbal formulations have now a day's undergone more thorough investigation for their potential in preventing and cure oral disease (Silva, 2012). Herbs have long been used traditionally for routine cleaning of teeth and dental disease and to treat various oral diseases (Deepa, 2011). Oral diseases like oral cancer, dental caries and periodontal diseases among the most important oral health problems. (Pallavi Sharma ,2015) There is a well-established link between the activities of microbial species that form part of the micro biota of the oral cavity and oral diseases. (Auta J 2007) The big need for alternative treatment, products and prevention options for oral diseases that are safe, economical and effective comes from the rise in disease incidence particularly in developing countries, increased resistance by pathogenic bacteria to currently used chemotherapeutics and antibiotics opportunistic infections in immunocompromized individuals and financial that is economical considerations in developing countries. (Pallavi Sharma ,2015) Moreover, allopathic medicine is too expensive and capital intensive for a developing country like India and has only limited success in the prevention and treatment of oral diseases and periodontal disease. Hence, the plant extracts used in traditional medicine and alternative products continues are considered as good alternatives to synthetic and organic medicine (Nagi, 2015) & (Jose, 2011). The present investigation deals with use of herbal genus Cordia and Guava Leaves in treatment of mouth ulcer in pharmaceutical gel. (Auta J 2007)

MATERIALS AND METHODS:

The fresh plant materials of Cordia Dichotoma and guava were collected from local area from Bhadrawati, Chandrapur district. Leaves of *C. dichotoma* G. Forst and guava were washed under running tap water and dried under shade at room temperature for two weeks. The dried leaves were ground into coarse powder and stored in air tight container. The collected plant was authenticated at Department of Botany, Post Graduate Teaching Department of Rashtrasant Tukadoji Maharaj University Nagpur. All other ingredients of analytical grade purchased from Finar Chemicals Ahmedabad and Samar Chemicals from Nagpur.

Preparation of herbal Gel

Carbopol 934 dispersed into distilled water



5 ml distilled water + methyl paraben and propyl paraben



Heating on water bath



After cooling propylene glycol add



Then add different concentration of *C. Dichotoma* and guava leaves powder



At last full mixed ingredients added in Carbopol 934 gel with properly



Continuous Stirring add triethanolamine drop wise for adjust pH (6.8-7)

The composition of herbal gel prepared from the powdered guava leaves coded as CG1, CG2, and CG3 is tabulated in Table 1.

Table 1: Composition of various gel formulations containing powdered *C.Dichotoma* leaves and guava leaves.

Ingredients	CG1	CG2	CG3
C. <i>Dichotoma</i> leaves powder	0.5%	1%	1.5%
Guava leaves powder	1%	2%	3%
Carbopol 934	2%	2%	2%
Propyl paraben	0.01%	0.01%	0.01%
Methyl paraben	0.0015%	0.0015%	0.0015%
Triethanolamine	q.s + pH 6.5-7	q.s + pH 6.5-7	q.s. + pH 6.5-7
Distilled water	Up to 20 ml	Up to 20 ml	Up to 20 ml

Evaluation of Herbal Gel

Physical Appearance

Physical parameters such as coloured and appearance of gel were checked.

Measurement of pH

The pH of herbal gel formulations were determined by using digital pH meter.

1 gm of gel dispersed in 10 ml of distilled water



Keep aside for two hours

The measurement of pH of formulation was carried out in three times. After finally the average values are generated pH of gel formulation was given in Table No 2. (Sanghavi, 1989).

Homogeneity

All developed gel formulations were tested for homogeneity by visual inspection after the gels

have been set in to the container. They were tested for their presence and appearance of any aggregates (Gupta, 2010). Homogeneity of gel formulation was reported in table no 2.

Spreadability

Spreadability was determined by glass slide and wooden block apparatus.

⇓

Weights about 20 gm were added to the pan

⇓

The time were noted for upper slide to move

⇓

Separate completely from the fixed slide (Shivhare, 2009)

⇓

An excess amount of gel 2 gm under study was placed on this ground slide

⇓

The gel was then sandwiched between this slides

⇓

Another glass slide having the fixed ground slide

There is provided with the hook.

A 1 kg weighted was placed on the top of the slides for 5 minutes to provide a uniform film of the gel and remove air between the slides. Excess of the gel was removed off from the edges. The top plate was then subjected to pull with the help of string attached to the hook and the time in seconds required by the top slide to cover a distance of 7.5 cm be noted. A shorter or less interval indicates better Spreadability. Spreadability of gel was calculated using the following formula (Pawar, 2013). Spreadability of gel was mentioned in table no 2.

Table 2: In vitro evaluation parameters (Kumar L, 2010)

Formulation	CG1	CG2	CG3
Evaluation parameter			
Physical appearance	Greenish	Greenish	Greenish
pH	6.7±0.8	6.8±0.9	6.9±0.7
Homogeneity	Good	Good	Good
Spreadability (gm.cm/sec)	5.50 ± 0.15	5.40 ± 0.13	5.60 ± 0.8
Viscosity (Pa·S)	3.011 ± 0.003	3.2 ± 0.004	3.091 ± 0.005
Extrudability	Good	Good	Good

Spreadability = $M \times L / T$ Where, M = Weight in the pan which is tied to the upper slide, L = Length moved by the glass slide T = Time in second taken to separate the slide completely each other.

Viscosity

Viscosity was determined by using Brookfield viscometer (DV-III programmable Rheometer). Formulated gels were tested for their rheological behaviors at 25⁰C. The measurement was made over range of speed from 10rpm to 100rpm with 30seconds between 2 successive speeds and then in a reverse orders (Bhramaramba, 2015).

Extrudability

Gel formulations were filled in standard capped collapsible aluminium tubes and sealed to the end. The extrudability was determined by pressing of the thumb.

Clarity

The clarity of all the three batches was determined by visual inspection (Pandey, 2011).

Gel strength

Gel strength was determined by the time in seconds required by the weight to penetrate in the gel. A Sample amount of 5 gm of each of the optimize batches was taken and 3.5 gm weight was placed on the surface of gel. The time in seconds required by the weight to penetrate 0.5 cm in the gel. The gel strength was then reported in table no 3.

Table 3: In vitro evaluation parameters

Formulation	CG1	CG2	CG3
Evaluation parameter			
Bio adhesive strength (dyne/cm ²)	4226.22 ± 16.82	3824.22 ± 18.92	4028.22 ± 18.42
Gelling Strength (Sec)	42±0.76	38±0.78	40±0.78

Table 4 :stability studies

Formulation	CG1	CG2	CG3
Stability Condition			
Open container (1 month)	Not Stable	Not Stable	Not Stable
Closed container (1 month)	Stable	Stable	Stable

Bioadhesive Strength (Velraj M, 2009)

Bioadhesive strength was determined by using glass slide and wooden block apparatus. Bioadhesive strength used to measuring the force required to detach the formulation from cellophane membrane. Specified amount that is 1 gm of prepared gel was taken on glass slide wrapped with cellophane membrane. Intimate contact was provided by the movable glass slide was placed on fixed slide. Two minute contact time was given to ensure intimate contact between formulation and membrane. The weight was added in the pan which is provided to apparatus until slides got detached. The bioadhesive force, expressed as the detachment stress in dyne/cm² was determined by the formula (Jaiswal, 2012). Bioadhesive strength was reported in table no 3.

Detachment stress = $m \cdot g / A$ Where, m = Weight required to detach two glass slides from each other (gm). g = Acceleration due to gravity i.e 980 cm/s². A = Area of membrane exposed (cm²).

Stability study

Stability studies were done with open and close container. Here, by subjecting the product to room temperature for 1 month (Kaur, 2013)&(Allen L). Stability study was reported in table no 4.

Antifungal activity

The antifungal activity of all developed batches of formulation and without drug containing gel formulation i.e. blank formulation were carried out by Cup-plate method in comparison with marketed antifungal formulation (Zolef cream). There are one bacteria culture used were *Aspargiliousaureus*. The antifungal test was performed using the agar well diffusion Prepared nutrient brought and poured in to sterile petri plates and kept for drying and cooling. After that each bacterial culture were spread by micron wire loop. A sterile cork borer 6 mm diameter was used to drill holes 4 mm deep. Then 0.5 gm of gel from each batches add in to this holes. Plates were then incubated at 27⁰C for 48 hr. The zone of inhibition (diameter in mm) developed, if any, was then measured for the particular compound with each fungal strength (Koland, 2011).

Antifungal studies were mentioned in table no. 5.

Table 5: In-vitro Anti Fungal study:

Formulation	Blank	CG1	CG2	CG3	Marketed preparation
Antifungal Study					
<i>Aspargiliousaureus</i> (mm)	12	24±0.4	20±0.6	21±0.8	26±0.8

DISCUSSION:

From the above mention results in table (1-5), it is clearly shows that all the prepared gel formulations having good homogeneity and gelling property. The pH of all gel formulations was in the range compatible with normal pH range of the skin. The rheological behavior was studied with remoter ranging between 3.011 to 3.2 Pa.S. Which is indicated that formulated gel was neither too thick and nor too thin. The study of Spreadability shows that with increasing the viscosity of formulation Spreadability decreases and vice versa. Extrudability study was done by pressing thumb and it's easily extendable. The gelling & bioadhesive strength of all the batches was found in the suitable range. One month stability study was done with open and close container and it's showed that open container containing gel was not stable and close container gel was stable. Formulated gel containing open container when expose to ambient room temperature then

syneresis was observed it means liquid exudates separating (Kaur, 2013). Syneresis occurs when the interaction between particles of the dispersed phase becomes so great that on standing. In that dispersing medium is squeezed out in droplets forms and the gel shrinks. Syneresis it means the form of instability in aqueous gels. All the three batches of developed formulation showed antifungal activity against *Aspergillus aureus* this are main microorganism responsible for mouth ulcer and formulation it can also use to treat mouth ulcer infection. the prepared gel having good in appearance, good stability and good effective in nature

CONCLUSION:

The data presented in this study, it was demonstrated that the prepared gel having good in appearance, good stability and good effective in nature against ulcer responsible bacteria and herbal gel formulation possess significant, therapeutically efficacious, suitable vehicle for drug delivery in low cost but definitely with high potential. Developed new herbal gel formulation is suitable for mouth ulcer treatment.

REFERENCES:

1. Pallavi Sharma (2015), Antifertility potential of hydroalcoholic extract of *Cordia dichotoma* G Forst. leaves: A folklore medicine used by Meena community in Rajasthanstate in India, *Asian Pacific Journal of Reproduction*, 2015 4(2), 100-105.
2. Blois (1958), Antioxidant determination by the use of stable free radical *Nature*, 181(4617), 1199-1200.
3. Bhramaramba (2015), Formulation and Evaluation of Herbal Gel Containing *Terminalia chebula* Retz Leaves Extract, *Scholars Academic Journal of Pharmacy*, 4(3), 172-176.
4. Dosani (2011), Formulation Development And Evaluation of unit Moulded Herbal Semisolid Jelly Useful In Treatment of Mouth Ulcer, *International Journal of PharmTech Research*, 3(3), 1705-1013.
5. Das (2011), Formulation and Evaluation of Herbal Gel Containing *Clerodendron fortuneatum* Leaves Extract, *International Journal of PharmTech Research*, 1(3), 140-143.
6. Dwivedi (2012), Formulation And Evaluation of Herbal Gel Containing *Sesbania Grandiflora* (L.) Poir. Leaf Extract, *Acta Chimica & Pharmaceutica India*, 1(2), 54-59.
7. Kumar L(2010), Verma R. In vitro evaluation of topical gel prepared using natural polymer. *Int J Drug Delivery* 2010, 2: 58-63.

8. Deepa (2011), Ethnomedicinal Practices for Oral Health and Hygiene of Tribal population of Wayanad Kerala, International journal of Research in Ayurveda & Pharmacy, 2(4), 1246-1250.
9. Jose (2011) Ethno medicinal Herbs Used in Oral Health and Hygiene in Coastal Dashing Kannada, Journal of Oral Health Community Dentistry, 5(3), 119-124.
10. Yogisha S., Raveesha K.A. In-vitro antibacterial effect of selected medicinal plant extracts of Albizzia species. J Natural Products 2009; 2:64-69
11. Gupta (2010), Formulation and Evaluation of Topical Gel of Diclofenac Sodium Using Different Polymers, Drug Invention Today, 2(5), 250-253.
12. Jaiswal (2012), Formulation and Evaluation of Thermo reversible In-Situ Nasal Gel of Metoprolol Succinate, 4(3), 96-102.
13. Jadhav (2015), Formulation and Evaluation of Herbal Gel Containing Leaf Extract of TridaxProcumbens, Journal of Pharmaceutical and Biosciences,3(2015), 65-72.
14. Velraj M(2009), Vijaylakshmi A, Jayakumari S, Ramamoorthy S, Shrikanth J, Ravichandiran. Antidepressant activity of the ethanolic extract of A. lebbek in the animal model of depression. Drug Invention Today 2009; 1(2): 112-115.
15. Kaur (2013), Topical Gel: A Recent Approach for Novel Drug delivery, Asian Journal of Biomedical and Pharmaceutical Sciences, 3(17), 1-5
16. Koland (2011), In vitro and in vivo evaluation of chitosan buccal films of ondansetron hydrochloride, International Journal of Pharmaceutical Investigation, 1(3), 164–171.
17. Mathangi (2013), DPPH Free Radical Scavenging Activity of the Extracts of the Aquatic Fern Marsileaquadrifolia Linn, International Journal of Current Microbiology and Applied Science, 2(10), 534-536
18. Nagi (2015), Role of Medicinal Herbs in Management of Oral Diseases – A Review, IOSR Journal of Dental and Medical Sciences, 14(8), 40-44.
19. Pawar (2013), Formulation And Evaluation of Herbal Gel Containing Lantana Camara Leaves Extract, Asian Journal of Pharmaceuticals & Clinical Research, (6)3, 122-124.
20. Pandey (2011), Formulation And Evaluation of Invitro Antimicrobial Activity of Gel Containing Essential Oils And Effect of Polymer on Their Antimicrobial Activity, International Journal of Pharmacy And Pharmaceutical Sciences, 3(1), 234-237.
21. Singh (2014), Formulation and Evaluation of Herbal Gel Containing Ethanolic Extract of Ipomoea Fistulosa, International Journal of Science and Research, (3)7, 1862-1866.

22. Silva (2012), Invitro Antimicrobial Activity of Mouthwashes and Herbal Products against dental biofilm- Forming bacteria, Contemporary Clinical Dentistry, 3(3), 302-305.
23. Sanghavi (1989), Study on Topical Piroxicam Formulations, Indian Drugs, 26(4), 165-168.
24. Shivhare (2009), Formulation Development and Evaluation of Diclofenac Sodium Gel Using Water Soluble Polyacrylamide Polymer, Digest journal of Nanomaterial's and Biostructers, (4)2, 285-290.
25. Wang (2014), Chemical Components and Bioactivities of Psidiumguajava, International Journal of Food Nutrition and Safety, 5(2), 98-114.
26. Auta J (2007), Anwa EP. Preliminary studies on Albizia lebbeck seeds: proximate analysis and phytochemical screening. Res J Biological Sci 2007; 2(1), 33-35.

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