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FORMULATION DEVELOPMENT AND EVALATION OF LOCAL ANESTHETIC PAIN RELIEF HERBAL DENTAL GEL FROM EXTRACT OF Anacyclus pyrethrum

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Abstract:

Anacyclus *pyrethrum* holds significant value as a medicinal herb that belongs to family *Asteraceae*. Plant root of *Anacyclus pyrethrum* known for its anaesthetic and pain relief activity .Root possess brown acrid compound known for its local anaesthetic activity. This research gives renovated evidence about pharmacological, medicinal and phytochemical effects of anacyclus pyrethrum. Plant root is a abundant source of phyto constituent like N alkylamides, Pellitorin, Pyrethrins, essential oil and some other compounds. The present review gives information about phytochemical screening, methods of extraction, historical back ground and medicinal effect of the plant. Because of present of number of phytochemicals plant shows many pharmacological effect such as antimicrobial, anti-inflammatory, local anaesthetic, aphrodisiac activities, it also possesses antioxidant, immune stimulatory and different other valuable medicinal properties. In future all parts of *Anacyclus pyrethrum* can be studied for different medicinal properties. Local anesthetic action of the plant can be helpful in developing varieties of herbal formulation.

I. INTRODUCTION:

- Gels are defined as semi rigid system in which the movement of the dispersing medium is restricted by an interlacing three dimensional network of particles or solvated macromolecules of the dispersed phase.
- The USP defines gels (sometimes called jellies) as semisolid system containing either suspension made up of small inorganic particles, or large organic molecules interpeneterated by liquid.
- The main purpose of the research was to develop and evaluate a dental gel containing an herbal medicine for the management of toothache.
- Anacyclus pyrethrum root contain an acrid compound called pyrethrin which is responsible for the various medicinal value of this plant especially its local anesthetic activity.

- Oral health is an integral component of general health. Oral health problem such as dental caries, periodontal diseases, and oral cancers are global concerns restricting a confining the day to day life.
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II. Nature of dental pain

- **short, sharp, shooting pain**: The type of pain can be neutralized due to tooth sensitivity, dentin hypersentivity, which is short , sharp pain cause due to expose dentin in respond to external stimuli.

Dull, throbbing pain : This type of pain may have several causes and the most common one is dental caries, root canal, tooth extraction.

III. **CLASSIFICATION OF GELS:**

BASED ON COLLOIDAL PHASES
BASED ON NATURE OF SOLVENT
BASED ON RHEOLOGICAL PROPERTIES
BASED ON PHYSICAL NATURE

IV. PREPARATION OF GELS

THERMAL CHANGES
FLOCCULATION
CHEMICAL REACTION

V. FAVORABLE PROPERTIES OF DENTAL GEL

HIGH THIXOTROPIC
OPTIMAL VISCOSITY FOR FILLING FISSURES
ADHERENT TO ENEMAL SURFACES
OPTICALLY CLEAR
ORALLY DIGESTIBLE

DRUG AND EXCIPIENT PROFILE"

Anacyclus pyrethrum Root scientific classification

Kingdom	**Plantae**
Division	Spermatophyta
Subdivision	Angiosperms
Class	Dicotyledons
Subclass	Metachlamydae
Order	Asterales
Family	Asteraceae
Tribes	Anthemidae
Genus	Anacyclus
Species	Pyrethrum

Chemical composition	**Uses**
Alkaloid, Tannins, Gallic tannins, triterpenes, sterols, trace metal Zn, Fe, Cr.Roots are rich in alkaloids, root contain brown acrid resins trace of tannic acid, Pellitorine , pyrethrin	Toothaches, Salivary secretion, digestive problem, female fertility, paralysis of tongue, anesthetic, angina.

Objectives:

- Extraction and characterization of *Anacyclus pyrethrum* Root.
- Selection of appropriate gelling agent for the formulation of dental gel.
- Formulation of dental gel using root extract, gelling agent ,preservatives and distilled water.
- To evaluate formulated dental gel.

MATERIAL AND METHODS:

1. Collection of plant material
2. Identification of plant material
3. Extraction by Soxhlet Apparatus and maceration
5. Physiochemical charecterization of Drug
   - Total Ash Value
   - Acid Insoluble
   - Water soluble
   - Sulphated Ash value
   - Extracvtive Value
6. Phytochemical screening of Extract
7. FTIR Analysis of Powder and Extract
8. UV Visible Spectroscopy chare cterization
9. Formulation Development
10. Evaluation of Dental Gel

RESULTS AND DISCUSSION:

I. Phytochemical Screening of Extract:

Test	Result
Mayer's test	positive
Dragendroff's test	positive
Saponin test	positive
Tannin test	positive
Detection of anthocyanins	Absent
Flavonoid test	positive
Steroid test	positive

II. Total Ash Value:

Physiochemical test	% Ash
Total Ash	**5%**
Acid Insoluble	**0.5%**
Water soluble Ash	4.5%
Sulphate Ash	**7.5%**

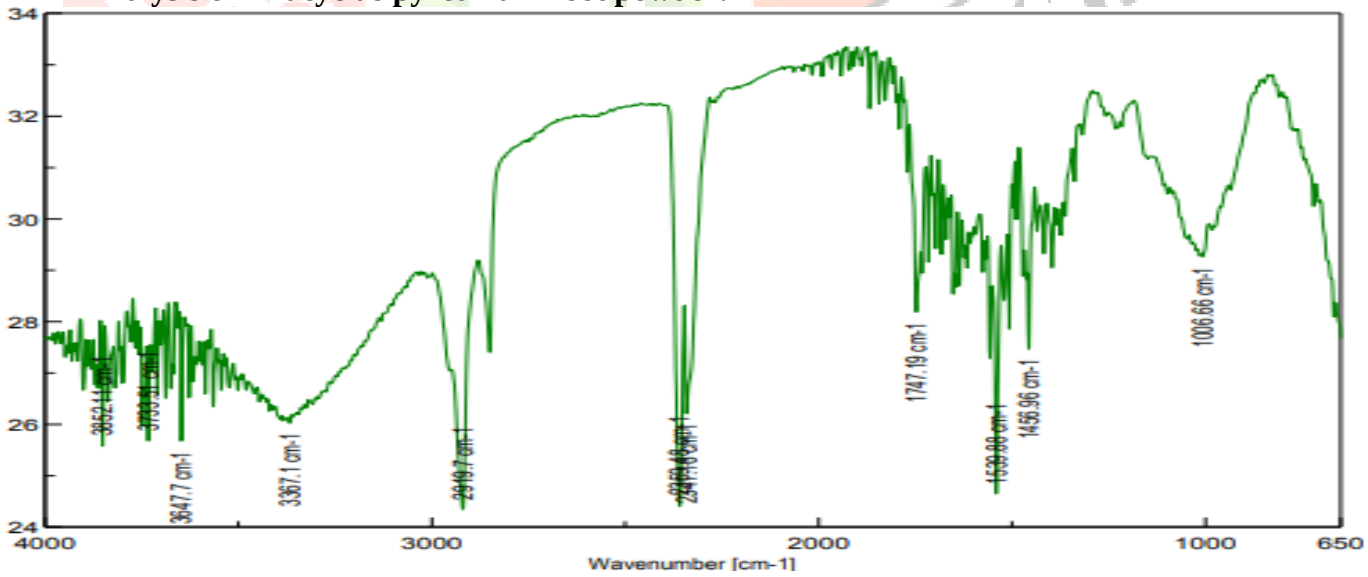
III. Extractive Value

Test	Extractive %
Alcohol Extractive Value	7%
Water Soluble	3%

IV. Functional group determination from FTIR Agnalysis:

Functional group	Reported Frequency (cm^{-1})	Observed frequency (cm^{-1})	Inference
C-C	1300-800	1006	Complied
$-CH_3$	1470-1430	1456	Complied
N-H	1550-1510	1539	Complied
CH_3-CHO	1745	1747	Complied
$=NH_2$	2700-2250	2341	Complied
O-H	3000-2500	2919	Complied
N-N	3500-3300	3367	Complied
Free O-H	3700-3500	3647	Complied

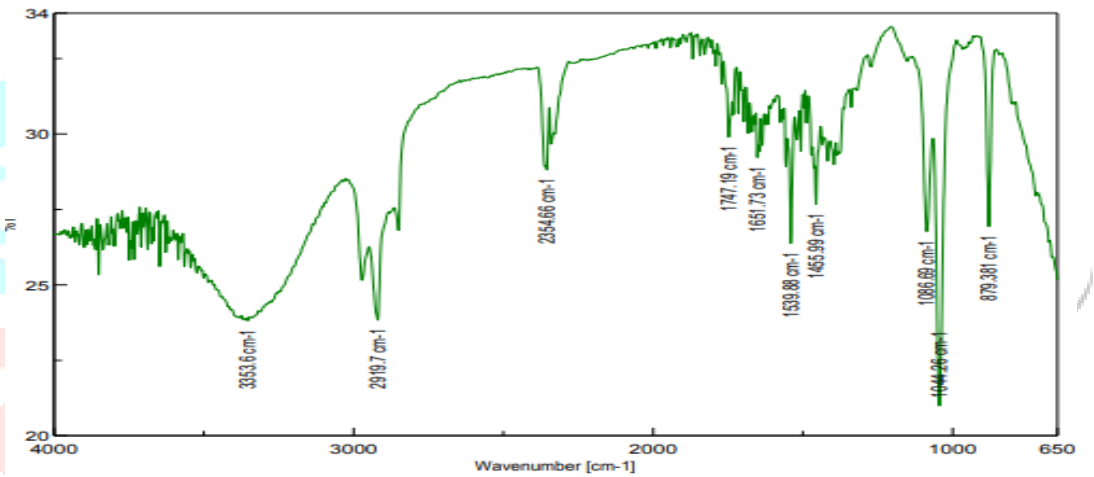
FTIR Analysis of Anacyclus pyrethrum root powder:



V. Functional Group Determination of Extract by FTIR:

Functional group	Reported frequency (cm^{-1})	Observed frequency (cm^{-1})	Inference
C-H	900-700	879	Complied
C-C	1300-800	1044, 1086	Complied
$-CH_3$	1470-1430	1455	Complied
N-H	1550-1510	1539	Complied
C=O	1670-1630, 1760-1730	1651, 1747	Complied
$=NH_2$	2700-2250	2354	Complied
O-H	3000-2500	2919	Complied
N-N	3500-3300	3353	Complied

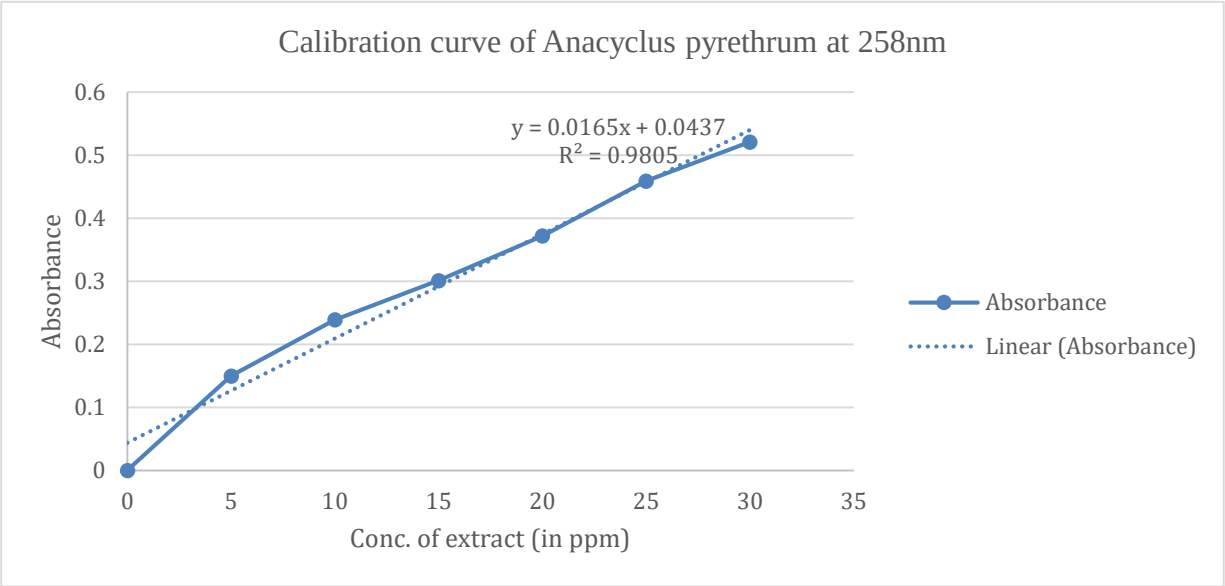
FTIR Analysis of Ethanolic Extract of Anacyclus pyrethrum Extract:



UV Calibration Curve : Absorbance of Extract at Various concentration:

Sr No	Concentration (ppm)	Absorbance (nm)
1	0	0
2	5	0.1498
3	10	0.2389
4	15	0.3012
5	20	0.372
6	25	0.459
7	30	0.521

Calibration curve of ethanolic Extract of plant:



Composition of Formulated Gel:

Sr. No.	Ingredient (Quantity in gram and ml)	F1	F2	F3	F4	F4
1	Anacyclus pyrethrum extract	1.5ml	1.5ml	1.5ml	1.5ml	1.5ml
2	Camphor	-----	0.2gm	0.2gm	0.2gm	0.2gm
3	Carbapol 940	0.6gm	0.3gm	----	0.4gm	0.6gm
4	Xanthan Gum	-----	0.4gm	0.9gm	----	---
5	Methyl paraben	0.06gm	0.06gm	0.06gm	0.06gm	0.06gm
6	Propyl paraben	0.03gm	0.03gm	0.03gm	0.03gm	0.03gm
6	Propylene glycol	1.5ml	1.5ml	1.5ml	1.5ml	1.5ml
7	Triethanolamine	0.36ml	0.36ml	0.36ml	0.36ml	0.36ml
8	Clove oil	Q.S	Q.S	Q.S	Q.S	Q.S
9	Glycerine	0.45ml	0.45ml	0.45ml	0.45ml	0.45ml
10	Distilled water	Q.S up to 30ml	Q.S up to 30ml	Q.S up to30 ml	Q.S up to 30 ml	Q.S up to 30ml

Consistency and odour of formulated gel:

Formulation	Consistensy	Odour
F1	Good	Characteristic
F2	Good	Characteristic
F3	Good	Characteristic
F4	Good	Characteristic
F5	Good	Characteristic

Percentage yield of formulated gel:

Formulations	Percentage yield (%)
F1	95.985
F2	96.110
F3	98.421
F4	96.874
F5	98.114

Determination of PH:

Formulation	PH
F1	6.5
F2	7.2
F3	7.1
F4	6.7
F5	6.8

Determination of extrudability:

Formulation	Extrudability (%)
F1	76
F2	79
F3	87
F4	85
F5	89

Determination of viscocity:

Formulation	Visscosity in cp
F1	**4200±32**
F2	**4300±28**
F3	**4700±20**
F4	**4100±25**
F5	**4400±40**

Result of spreadability:

Formulation	Spreadabilitygcm/se
F1	29 .30
F2	29.10
F3	28.21
F4	23.20
F5	33.21

Result of homogeneity:

Formulation	Homogeneity
F1	Good
F2	Good
F3	Good
F4	Good
F5	Good

Determinaton of gel Strength:

Formulation	Gel Strength
F1	36±0.5
F2	32±0.10
F3	30±0.24
F4	29±0.75
F5	27±0.10

Stability Study of Formulated Gel:

Formulations	Initial	After three month
F1	6.5	6
F2	7.2	6.9
F3	7.1	7
F4	6.7	6.5
F5	6.8	6.7

Table Determination of PH after three month

Determination of viscosity after three month:

Formulations	Initial	After three month
F1	**4200±32**	**4200±20**
F2	**4300±28**	**4278±20**
F3	**4700±20**	**4678±10**
F4	**480±25**	**480±12**
F5	**4400±40**	**4400±25**

Excrudability after three month:

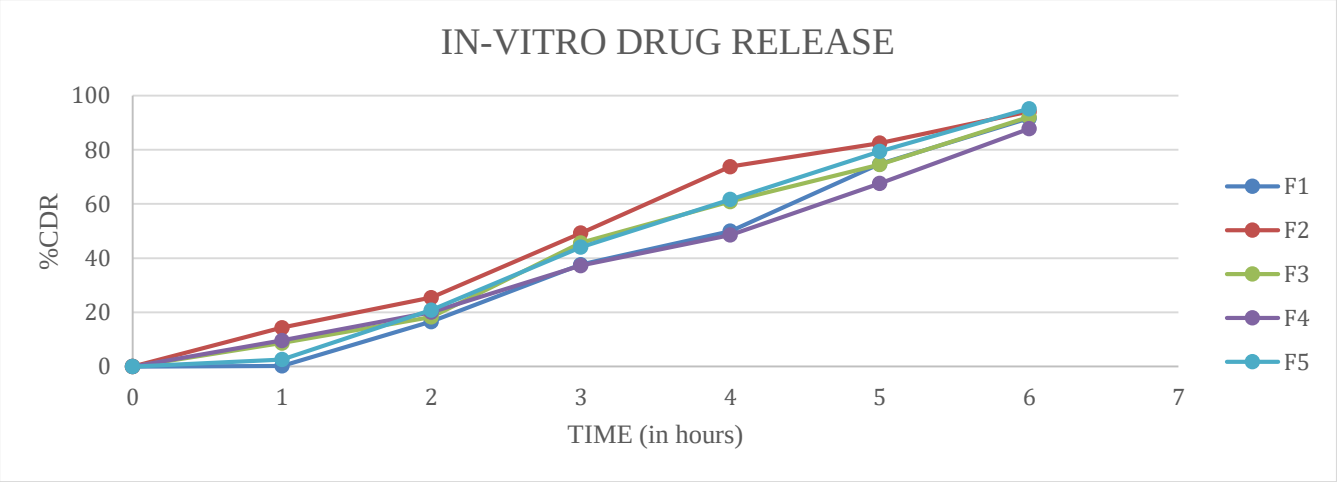
Formulation	Initial	After three month
F1	76	75
F2	79	78
F3	87	86
F4	85	85
F5	89	87

Homogenisity After three month:

Formulation	Initial	After three month
F1	Good	Good
F2	Good	Good
F3	Good	Good
F4	Good	Good
F5	Good	Good

In Vitro drug release of formulated gel batches F1 to F5:

Time (Hours)	In-vitro drug release (%) CDR Batch No				
	F1	**F2**	**F3**	**F4**	**F5**
0	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
1	0.22±0.84	14.35±0.64	8.65±0.91	9.65±0.40	2.6±0.23
2	16.60±0.40	25.46±0.14	18.29±0.55	20.06±0.50	20.86±0.12
3	37.60±0.65	49.26±0.25	45.64±0.70	37.28±0.30	44.06±0.12
4	49.96±0.79	73.77±1.34	60.89±0.76	48.57±0.50	61.67±0.22
5	74.72±0.23	82.45±1.03	74.56±0.23	67.56±0.34	79.40±0.50
6	91.64±0.45	94.13±0.72	92.13±0.78	87.78±0.80	95.17±0.20



CONCLUSION:

The Natural remedies are more acceptable in the blief that they are safer with lesser side effect than the synthetic medicines.Nowadys herbal formulation have increasing demand in the world market .It is very good attempt to establish herbal gel of anacyclus pyrethrum extract with camphor and clove oil .The data presented in this study The study demonstrated the significant result of anacyclus pyrethrum root extract gel. The formulation gel F5 was more stable , more efficient as compared to other batches.,suitable vehicle for drug delivery in low cost but definitely with high potential .The result showed that due to combination dosage form developed new herbal gel formulation having good anesthetic activity so it safe, stable and good for dental pain manegment. Hence formulation batch F5 has been considered as optimized batch and can be used for further future prospective.

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