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Research Article

**FORMULATION DEVELOPMENT AND EVALUATION OF
POLYHERBAL GEL OF EFFECTIVE TREATMENT OF ACNE**

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Abstract:

The present research work deals with formulation and evaluation of herbal gels against this etiologic agent of acne vulgaris. Acne vulgaris is a most common skin disorder of pilosebaceous unit that affect areas containing the largest oil glands, including the face, back, and trunk. It is generally characterized by formation of seborrhea, comedone, inflammatory lesions. Propionibacterium acnes have been recognized as pus-forming bacteria triggering an inflammation in acne. The crude extracts so obtained after the maceration process, each extracts were further concentrated on water bath evaporation the solvents completely to obtain the actual yield of extraction. To obtain the percentage yield of extraction is very important phenomenon in phytochemical extraction to evaluate the standard extraction efficiency for a particular plant, different parts of same plant or different solvents used. The extractive value of Embelia ribes, Acacia nilotica and Chenopodium album was found 6.98, 5.77, and 7.23% respectively. The prepared gel were evaluated for Psycho Rheological Characteristists, washability and Extrudability, spreadability, Determination of pH, Viscosity, and phenol content Formulations of gel the spreadability ranging 9.25 ± 2.10 to 13.25 ± 1.25 the optimized formulation PHG4 is good (10.23 ± 2.36). The formulation PHG4 has good viscosity 2545 ± 11 . The polyherbal gel obtained from plant used to suitably dilute upto the concentrations of 100, 50 and 25 microgram per ml and applied on to the test organism using well diffusion method.

Keywords: Viscosity, extrudability, rheology, drug content, extraction

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INTRODUCTION:

Herbal medicines and their preparations have been widely used traditionally, for the thousands of years in developing and developed countries owing to its natural origin and lesser side effects or dissatisfaction with the results of synthetic drugs. One of the characteristics of oriental herbal medicine preparations is that all the herbal medicines, either presenting as single herbs or as collections of herbs in composite formulae¹. The traditional preparations comprise medicinal plants, minerals, organic matter, etc. Herbal drugs constitute mainly those traditional medicines which primarily use medicinal plant preparations for therapy. These drugs are made from renewable resources of raw materials by eco-friendly processes and will bring economic prosperity to the masses growing these raw materials.

India is known as the “Emporium of Medicinal plants” due to availability of several thousands of medicinal plants in the different bioclimatic zones. Medicinal plants continue to provide valuable therapeutic agents, both in modern medicine and in traditional systems of medicine. Attention is being focused on the investigation of efficacy of plant based drugs used in the traditional medicine because they are economy, have a little side effects and according to W.H.O, about 80% of the world population rely mainly on herbal remedies⁵. The World Health Organization has recently defined traditional medicine (including herbal drugs) as comprising therapeutic practices that have been in existence, often for hundreds of years, before the development and spread of modern medicine and are still in use today⁶. The uses of traditional medicines are widely spread

and plants represent a large source of natural chemicals that might serve as leads for the development of the novel drugs⁷. Scientists have devised different ways of alienating the problem and one of the easy and cheapest options is herbal medicines. Herbs have been in use since long time to treat various diseases. Almost one fourth of pharmaceutical drugs are derived from botanicals.

MATERIALS AND METHOD:

Crude drugs are derived from natural sources like plants, animals and minerals. It is important that they should be properly identified and characterized for their physical and chemical characteristics and their quality should be enforced.

Plant material collection

Seeds of *Embelia ribes*, bark of *Acacia nilotica* and leaves of *Chenopodium album* were collected from local area of Bhopal (M.P.) in the month of March, 2019.

Extraction of plant material

Dried powdered of seeds of *Embelia ribes*, bark of *Acacia nilotica* and leaves of *Chenopodium album* has been extracted with methanol using maceration process for 48 hrs, filtered and dried using vaccum evaporator at 40°C.

RESULT AND DISCUSSION:**Determination of Percentage Yield**

Yield of Extraction: The yield of extracts obtained from methanol as solvent are depicted in the table 1.

Table No. 1: % Yield of methanolic extract

S. No.	Extracts	% Yield (w/w)
1	<i>Embelia ribes</i> extract	6.98
2	<i>Acacia nilotica</i> extract	5.77
3	<i>Chenopodium album</i> extract	7.23

Phytochemical screening of extract: The outcomes of the results are discussed separately in the table 2.

Table No. 2: Result of Phytochemical screening of methanol extracts

S. No.	Constituents	<i>Embelia ribes</i>	<i>Acacia nilotica</i>	<i>Chenopodium album</i>
1.	Alkaloids	-ve	+ve	-+ve
2.	Glycosides	-ve	-ve	-ve
3.	Flavonoids	+ve	+ve	-ve
4.	Diterpenes	+ve	+ve	+ve
5.	Phenolics	+ve	+ve	+ve
6.	Amino Acids	-ve	+ve	-ve
7.	Carbohydrate	+ve	+ve	+ve
8.	Proteins	-ve	+ve	-ve
9.	Saponins	+ve	+ve	+ve
10.	Oils and fats	-ve	-ve	-ve

Results of Estimation of Total Phenolic and flavanoid content estimation

Total Phenolic content estimation (TPC)

The content of total phenolic compounds (TPC) content was expressed as mg/100mg of gallic acid equivalent of dry extract sample.

Calibration Curve of Gallic acid

Table No. 3: Preparation of calibration curve of Gallic acid

S. No.	Concentration	Absorbance
0	0	0
1	5	0.194
2	10	0.422
3	15	0.637
4	20	0.848
5	25	1.035

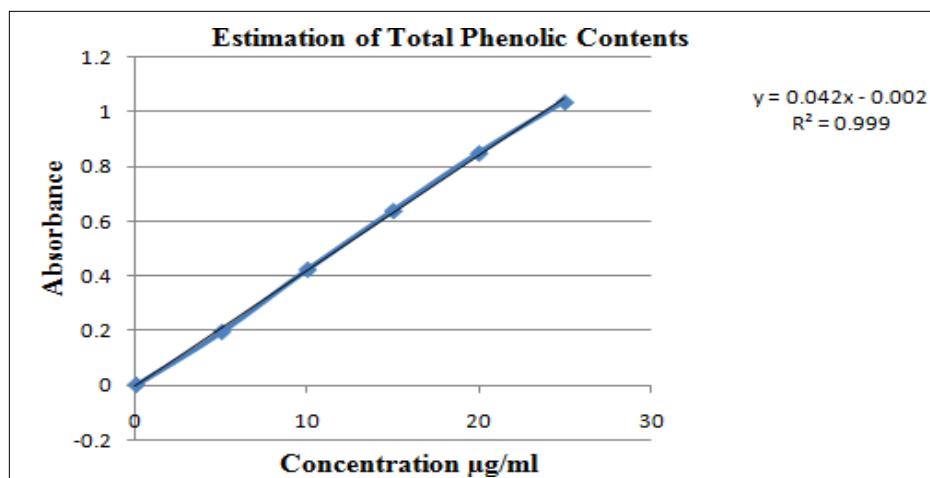


Figure 1: Graph of Estimation of Total Phenolic content

Total flavonoid content estimation (TFC)

The content of total flavonoid compounds (TFC) content was expressed as mg/100mg of quercetin equivalent of dry extract sample.

Calibration Curve of Quercetin**Table No. 4: Preparation of calibration curve of Quercetin**

S. No.	Concentration	Absorbance
0	0	0
1	5	0.352
2	10	0.61
3	15	0.917
4	20	1.215
5	25	1.521

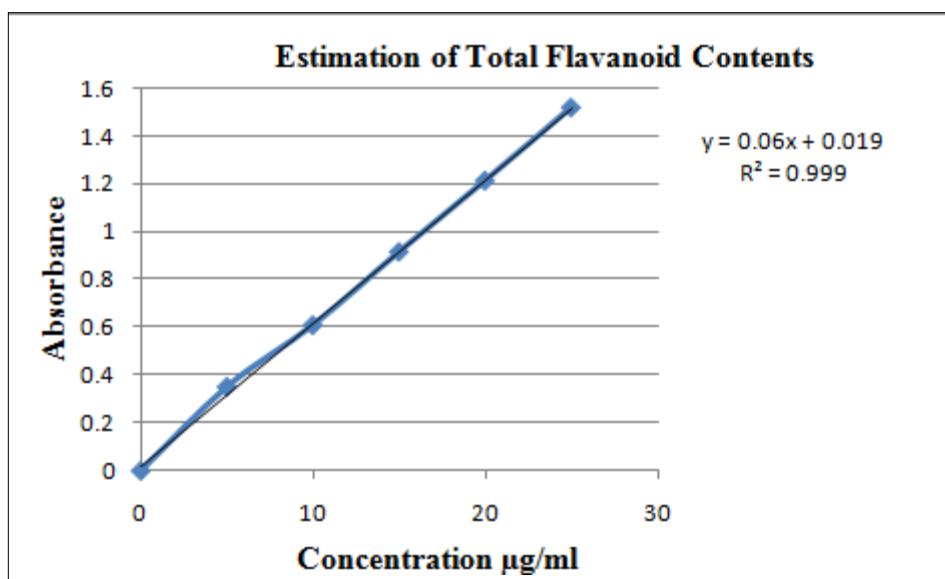


Figure 2: Graph of Estimation of Total flavanoid content

Table No. 5: Total Phenolic and Total flavanoid content

S. No.	Solvents→ Bioactive compound↓	Methanolic extracts		
		<i>Embelia ribes</i>	<i>Acacia nilotica</i>	<i>Chenopodium album</i>
1.	Total Phenol (Gallic acid equivalent (GAE)mg/100mg)	0.657	0.916	0.788
2.	Total flavonoid (Quercetin equivalent(QE) mg/100mg)	0.421	0.213	-

Results of Formulation Development of polyherbal Gel**Evaluation of gel formulation of polyherbal Gel****Table No. 6: Results of Psycho Rheological Characteristics**

Formulation	Colour	Clogging	Homogeneity	Texture
PHG1	Brown	Absent	Good	Smooth
PHG2	Brown	Absent	Good	Smooth
PHG3	Brown	Absent	Good	Smooth
PHG4	Brown	Absent	Good	Smooth
PHG5	Brown	Absent	Good	Smooth
PHG6	Brown	Absent	Good	Smooth

Results: In the above formulations of gels, it has been noted that all of them has clear colour, No clogging, good homogeneity and smooth texture.

Results of washability and Extrudability**Table No. 7: Results of washability and Extrudability**

Formulation	Washability	Extrudability
PHG1	Good	Good
PHG2	Good	Good
PHG3	Good	Good
PHG4	Good	Good
PHG5	Average	Good
PHG6	Average	Good

Results: In the above formulations of gels, they have good washability as well as extrudability.

Results of spreadability**Table No. 8: Results of spreadability**

Formulation	Spreadability (gcm/sec)
PHG1	13.25±1.25
PHG2	12.25±1.23
PHG3	11.23±1.45
PHG4	10.23±2.36
PHG5	9.85±2.32
PHG6	9.25±2.10

Results: In all above formulations of gel the spreadability ranging 9.25±2.10 to 13.25±1.25 the optimized formulation PHG4 is good (10.23±2.36).

Determination of pH

Table No. 9: Determination of pH

Formulation	pH
PHG1	6.92±0.11
PHG2	6.95±0.15
PHG3	7.02±0.11
PHG4	7.02±0.14
PHG5	7.08±0.12
PHG6	7.15±0.13

Results: The above formulation of topical gels has different pH value for different formulation

Results of Viscosity

Table No. 10: Results of Viscosity

Formulation	Viscosity (cps)
PHG1	2865±12
PHG2	2750±15
PHG3	2655±14
PHG4	2610±10
PHG5	2545±11
PHG6	2415±14

Results: In the above formulations the viscosity of different sample of gel were determined and found that there is increase in viscosity. The formulation PHG4 has good viscosity 2545±11 .

Results of phenol content

Table No. 11: Results of phenol content using Folin-Ciocalteu method

Formulation	% Phenol content (equivalent to gallic acid mg/100mg)
PHG1	2.45
PHG2	2.12
PHG3	2.19
PHG4	2.65
PHG5	2.31
PHG6	2.05

Results: In the above formulation of different gels the percentage of drug content was found that PHG4 has maximum percentage of drug content.

Results of antimicrobial activity of optimized formulation

Antibiogram studies

The present investigation in this research work, the Anti-acne activity of polyherbal gel of Seeds of Embelia ribes, bark of Acacia nilotica and leaves of Chenopodium album were evaluated against Propionibacterium acnes pathogens used under present study.

Table No. 12: Anti-acne activity of standard and polyherbal gel formulation against *Propionibacterium acnes*

S. No.	Formulation	Zone of inhibition		
		100mg/ml	50 mg/ml	25mg/ml
1.	Clintop (Marketed gel)	18±0.5	16±0.94	15±0.57
2.	Polyherbal gel	20±0.74	17±0.5	16±0.57

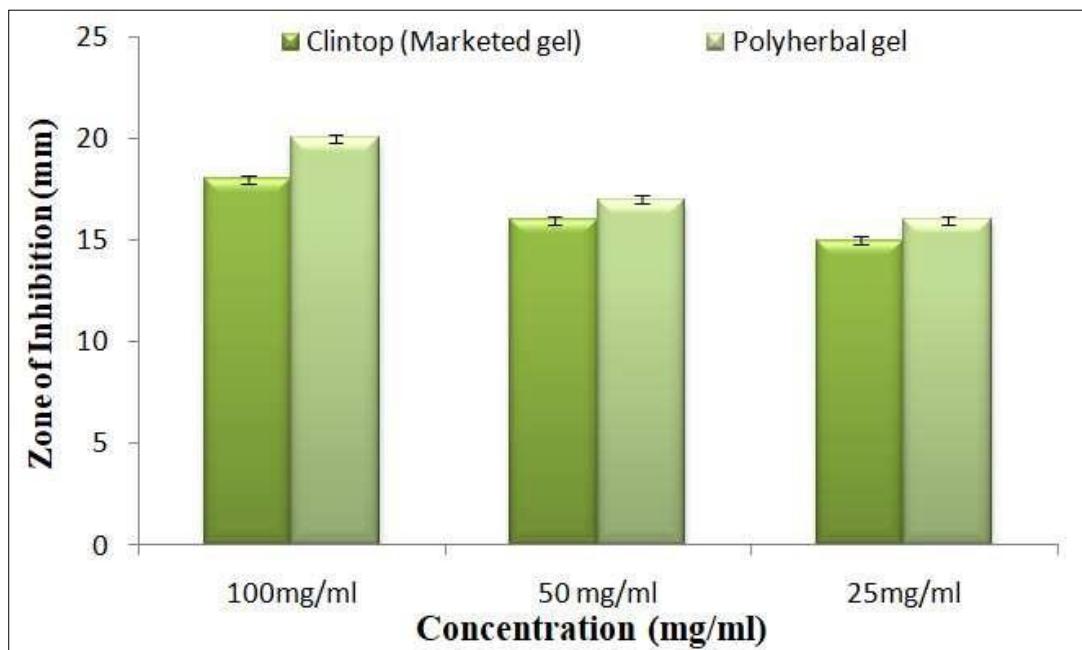


Figure 3: Anti-acne activity of marketed gel and polyherbal gel formulation against *Propionibacterium acnes*

SUMMARY AND CONCLUSION:

The present research work deals with formulation and evaluation of herbal gels against this etiologic agent of acne vulgaris. The extractive value of Embelia ribes, Acacia nilotica and Chenopodium album was found 6.98, 5.77, and 7.23% respectively. The content of total phenolic compounds (TPC) content was expressed as mg/100mg of gallic acid equivalent of dry extract sample using the equation obtained from the calibration curve: $Y = 0.042X+0.002$, $R^2= 0.999$, where X is the gallic acid equivalent (GAE) and Y is the absorbance. The content of total flavanoid compounds (TFC) content was expressed as mg/100mg of quercetin equivalent of dry extract sample using the equation obtained from the calibration curve: $Y = 0.06X+0.019$, $R^2= 0.999$, where X is the quercetin equivalent (QE) and Y is the absorbance. The prepared gel were evaluated for Psycho Rheological Characteristists, washability and Extrudability, spreadability, Determination of pH,

Viscosity, and phenol content. In all above formulations of gel the spreadability ranging 9.25 ± 2.10 to 13.25 ± 1.25 the optimized formulation PHG4 is good (10.23 ± 2.36). In the above formulations the viscosity of different sample of gel were determined and found that there is increase in viscosity. The formulation PHG4 has good viscosity 2545 ± 11 . The present investigation in this research work, the Anti-acne activity of polyherbal gel of Seeds of Embelia ribes, bark of Acacia nilotica and leaves of Chenopodium album were evaluated against *Propionibacterium acnes* pathogens used under present study.

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