



## Formulation and Evaluation of Herbal Cream Containing Hydro-Alcoholic Extract of *Achyranthes aspera* Linn. (Roots) Used for the Treatment of Vaginal Infection

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### Abstract

The women's are suffering from a number of gynecological diseases among which vaginal infection is most common which include irritation, itching and swelling and are very frequent and common among women due to various un-hygienic issues. According to ancient literature like Ayurveda several herbs are used to cure women disorders. The present investigation aims to development of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots). Various batches HC1 to HC8 were prepared using different ratio of ingredients and were evaluated. The data obtained indicate that HC5 have excellent results when compared with other formulation codes.

**Keywords:** Vaginal Infection; *Achyranthes aspera*; Herbal Cream

### Introduction

According to NICHD i.e., National institute of Child Health and Human development there are five types of major gynecological disorders associated with females, these include vulvodynia, vaginitis, pelvic floor disorders, pelvic pain and menstrual disorders. In India approximately every women suffers from gynecological disorders such as vaginal infection, menstrual troubles or any other associated disease. The percentage is more in rural women than urban women and the reason behind this is the life style, food habit and un-hygienic conditions in rural areas [1,2].

*Achyranthes aspera* Linn. commonly known as charchira belongs to family Amaranthaceae is traditional herbal drugs used in the treatment of women disorders from ancient. The various part of plant is used for the treatment of inflammation, bacterial infection, fungal infection etc. especially concerned to women disorders [3]. Keeping this concept in mind the present study was designed to formulate and evaluate herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots).

### Materials and Methods

#### Selection of plants/plant material

The herb viz., *Achyranthes aspera* Linn. (Roots) ASR, used in the treatment of gynecological disorders were selected based on the

traditional claims as mentioned in folk-lore. The above mentioned herbs are widely used in traditional medicine for the treatment of gynecological disorders.

#### Collection and authentication of plant/plant material

The plant material selected for the present investigation viz., *Achyranthes aspera* Linn. (Roots) ASR, was collected in the months of Dec' 2016 to Jan, 2017 from various sites of Malwa region of Madhya Pradesh and identified and authenticated by Dr. S.N. Dwivedi, Professor and Head, Department of Botany, Janata PG College, A.P.S. University, Rewa, (M.P.) and was deposited in our Laboratory, Voucher specimen No. P/AS-R/1812.

#### Extraction of Plant material

250 gm of the air dried coarsely powdered roots of *Achyranthes aspera* Linn. (ASR) was placed in soxhlet apparatus and was extracted with ethanolic and hydro-alcohol (water: ethanol: 70:30) until the extraction was completed. After extraction, the filtrate was evaporated to get the extract [4].

#### Plant extracts

The hydroalcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) were taken for formulation of herbal tablets.

### Formulation of herbal cream

The various steps involved in formulation of herbal cream were mentioned as described below [5,6]

- **Preparation of oil phase:** Stearic acid, cetyl alcohol, almond oil in desired quantity were taken in porcelain dish and was melted at 70°C.
- **Preparation of aqueous phase:** Hydroalcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots)

ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL, glycerol, methyl paraben, triethanolamine and water were taken in another porcelain dish and were heated at 70°C.

- **Addition of aqueous phase to oil phase:** The aqueous phase was added to the oil phase with continuous stirring at room temperature. Perfume was added at last and the formulation was transferred in a suitable container.

Ingredients	Formulation Code (HAEASR)							
	HC1	HC2	HC3	HC4	HC5	HC6	HC7	HC8
HAEASR	0.5	0.75	1.0	1.5	0.5	0.75	1.0	1.5
Stearic acid	5	5	5	5	10	10	10	10
Cetyl alcohol	10	10	10	10	5	5	5	5
Almond oil	5	5	5	5	5	5	5	5
Glycerol	3	3	3	3	3	3	3	3
Methyl paraben	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Triethanolamine	qs	qs	qs	qs	qs	qs	qs	qs
Water (100 ml)	qs	qs	qs	qs	qs	qs	qs	qs
Total weight	100	100	100	100	100	100	100	100

**Table 1:** Formulation of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.

**Note:** All values are taken in gm.

### Evaluation parameters of herbal cream

The prepared formulations were evaluated for the following parameters [5-9].

- **Physical evaluation:** The physical evaluation of the herbal cream was done by evaluating clarity and transparency which was determined visually. The samples were observed in light at white background.
- **Determination of pH:** The pH meter was calibrated first and zero reading was recorded. The samples were taken in the beaker and the readings were taken from calibrated electrode. The procedure was repeated and three average reading was recorded.
- **Determination of Viscosity:** The viscosity of the herbal cream was determined by Brookfield viscometer using spindle no 01 at 20 rpm at temperature 4°C and 37°C. About 15ml of the was taken in beaker and spindle was immersed in the formulation. The reading was recorded at initial and after rotation at different temperature. The reading was recorded thrice.

- **Determination of Homogeneity:** All the prepared herbal cream was tested for homogeneity by visual inspection and was evaluated for presence of any aggregates present in the formulation.
- **Determination of Spreadability:** The spreadability was determined for all the prepared herbal cream. The formulations were placed on the glass slide and the empty glass slide was placed on the top of gel containing slide. The formulation was placed in such a way that it was placed between two slides. The occupied distance of the slides was observed to be of 7.5 cm. The herbal cream was placed between slide and pressed to form thin uniform layer. The weight kept on the herbal cream was removed. The excess herbal cream observed in the slides was removed. The two slides were fixed and on the upper glass slide the  $20 \pm 0.5$  g of the weight was tied. Due to weight the both the slides were separated which was recorded as time to complete the separation distance of 7.5 cm. The three readings were recorded and mean time was taken. The spreadability was calculated as  $S = m \times l/t$

- $l$  is the length of slide (7.5 cm),  $m$  is the weight which is tied to slides and  $t$  is the time taken in second.
- Determination of Wetness: The prepared herbal cream was determined for wetness by applying on skin surface.
- Determination of type of smear: The prepared herbal cream was applied on the skin surface and after the application the type of film or smear formed on the skin was recorded.
- Determination of Emolliency: The prepared herbal cream was checked for emolliency, slipperiness and amount of residue left after the application of cream.

### Determination of type of Emulsion

#### Dilution test

The prepared herbal cream was diluted with oil or water depending upon the type of emulsion whether o/w or w/o the results obtained were noted down.

#### Dye solubility test

The prepared herbal cream was mixed with a water soluble dye i.e., amaranth and was observed under the microscope. The results obtained were interpreted.

### Determination of drug content

The content of the herbal cream was estimated using UV-Visible spectrophotometer. Near about 1g of the formulation was taken in 50 ml of volumetric flask. The solution was make up to mark with methanol. The solution was shaken and filtered though whatman filter paper. The 0.1ml of the filtrate was further diluted to 10ml with solvent and estimated at suitable wavelength.

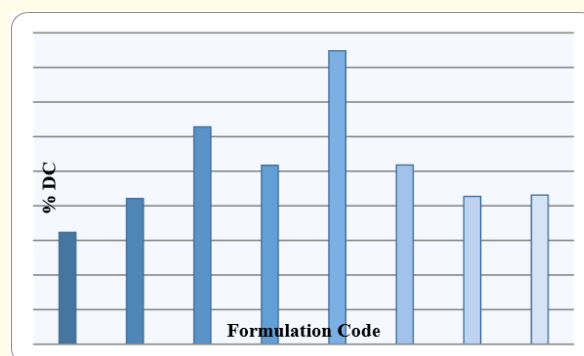
### In vitro drug release

The semi permeable dialysis membrane bag (7cm long) was prepared and the herbal cream was placed in the membrane. The dialysis bag was ten suspended in 50ml of ethanol: water (1:1) at temperature  $37^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$  in water bath. About 1ml of sample was withdrawn from the membrane at predetermine interval and the fresh equal volume was replaced simultaneously. The samples were withdraw till one week and were diluted and analyzed by UV Visible spectrophotometer at suitable  $\lambda_{\text{max}}$ . The experiment was repeated trice and the cumulative amount of drug release was calculated from the reading.

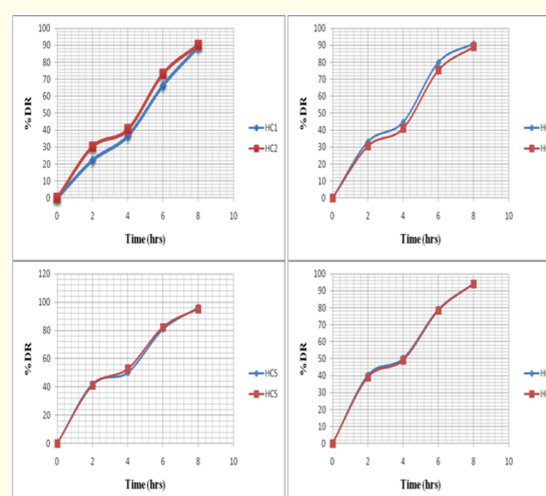
## Results and Discussion

The investigation of the efficiency of plant extract and their formulations in induced systemic and local infection model is of quite interesting. Several researchers have evaluated the effects of plant extracts along with their formulations in systemic infections and in induced vaginal infection. It was also noted that now-a-days there

are several herbal formulations are in the market used for the vaginal infection and they having very less or no adverse/side effects. The present work was undertaken to develop and evaluate herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots). The selected hydroalcoholic extract viz., HAEASR *Achyranthes aspera* Linn. (Roots) along with various excipients selected were mixed according to the formula mentioned and various evaluation parameters were carried out to validate the efficacy of the prepared formulation. The formulated herbal cream containing hydroalcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) were evaluated as per standard protocols. The detail results are mentioned in table 2. The drug content was found maximum in F5 i.e., 100.02% and minimum 99.48 % (Table 2). The results of drug release profile indicates that the formulation F5 has maximum release of 96.15 % at (Table 3, Graph 2).



**Graph 1:** Drug content of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.



**Graph 2:** % Drug release of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.

Formulation Code	Parameters								
	Appearance	pH	Viscosity	Homogeneity	Spreadability	Wetness	Type of smear	Emolliency	Type of Emulsion
HAEASR									
HC1	Pale white and Clear	6.8	27015	H	65.29	+++	NG	NRL	o/w
HC2	Pale white and Clear	6.9	27009	H	62.18	+++	NG	NRL	o/w
HC3	Pale white and Clear	6.8	27015	H	59.23	+++	NG	NRL	o/w
HC4	Pale white and Clear	6.9	27022	H	64.82	+++	NG	NRL	o/w
HC5	Pale white and Clear	7.0	27019	H	60.38	+++	NG	NRL	o/w
HC6	Pale white and Clear	6.9	27018	H	63.29	+++	NG	NRL	o/w
HC7	Pale white and Clear	6.9	27025	H	62.15	+++	NG	NRL	o/w
HC8	Pale white and Clear	6.8	27019	H	61.72	+++	NG	NRL	o/w

**Table 2:** Evaluation parameters of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.

**Note:** H=Homogeneous, NH=Non homogeneous, +=Good, ++=Better, +++=Best, G=Greasy, NG= Non-greasy, NRL=No residue left, LR=Residue left

Formulation Code	HAEASR
HC1	94.23
HC2	95.21
HC3	97.28
HC4	96.17
HC5	99.48
HC6	96.18
HC7	95.27
HC8	95.31

**Table 3:** Drug content of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.

Time (Hrs)	% Drug Release							
	HC1	HC2	HC3	HC4	HC5	HC6	HC7	HC8
0	0	0	0	0	0	0	0	0
2	22.12	30.17	33.15	30.62	42.15	41.22	40.29	39.06
4	36.39	40.26	44.72	41.02	50.21	52.81	50.18	49.17
6	66.19	73.14	79.91	75.29	80.81	82.31	79.06	78.47
8	88.91	90.19	90.93	89.09	96.15	95.28	94.27	94.13

**Table 4:** % Drug release of herbal cream containing hydro-alcoholic extract of *Achyranthes aspera* Linn. (Roots) ASR.

## Conclusion

From the results obtained it was concluded that the hydro-alcoholic extract of selected herbs *Achyranthes aspera* Linn. (Roots) have effective results when formulated in the form of cream. The formulation code F5 has promising and effective drug content and release. Hence, it was concluded from the present investigation that the selected herbs will have a prominent effect in the treatment of vaginal infection, though the pharmacological screening and clinical approaches need to establish for the formulation of safe and effective herbal drugs.

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