

Pharmaceutical Development and Evaluation of Eladi Gutika

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER'S OF PHARMACY (AYURVEDA)

In

Rasashastra & Bhaishajya Kalpana

By

Neha Kumari
(11501325)

Under the guidance of

Dr. Manish Vyas
Associate Professor
Rashashastra & Bhaishajya Kalpana



**School of Ayurvedic Pharmaceutical Sciences
Lovely Professional University
Punjab 144411**

**May
2017**

Statement by the Candidate

This is to submit that this written submission in my project report entitled “Pharmaceutical development and evaluation of Eladi Gutika” represents original ideas in my own words and where others’ ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have stuck to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above wills because for disciplinary action by the School and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when required. I assure and hold full responsibility for its genuineness.

Forwarded Through
Dr. Manish Vyas
Associate Professor

Neha Kumari
Reg. No: 11501325
Section: Y1553

Certificate by Supervisor

The work described in this project report entitled “Pharmaceutical development and evaluation of Eladi Gutika” has been carried out by Neha Kumari (11501325) under my supervision. I certify that this is her bonafide work. The work described is original and has not been submitted for any degree to this or any other university.

Date:
Place:

Dr. Manish Vyas
Associate professor

Certificate by School

This is certified that the work described in this project report entitled “Pharmaceutical development and evaluation of Eladi Gutika” Has been carried out by Neha kumari at the School of Ayurvedic Pharmaceutical Sciences, Lovely Professional University, Punjab.

Mr. Saurabh Singh Baghel
(COD)
Ayurvedic Pharmacy

Dr. Monica Gulati
(Professor &Sr. Dean)
Sr. Dean and Head of School

Acknowledgement

First and above all, I praise god, the almighty for providing me this opportunity and granting me the capability to proceed successfully. This thesis appears in its current form due to assistance and guidance of several people.

I would like to express my deepest gratitude to my guide “**Dr. Manish Vyas**” Associate professor, Lovely School of Ayurvedic Pharmaceutical Sciences, Lovely Professional University for their valuable warm encouragement, thoughtful guidance, gracious attention and motivation for completing my project work. It gives me immense pleasure to submit my dissertation work as his student.

I want to express my deep thanks to “**Dr. Gopal Lal Khatik**” for the trust, the insightful discussion, offering valuable advice, for your support during the whole period of the study, and especially for your patience and guidance during the writing process.

I am very obliged to “**Mr.SaurabhSinghBaghel**”COD, “**Mr. Dileep singh Baghal (HOL)**”and **Prithvi Raj**(Lab Technical)Lovely School of Ayurvedic Pharmaceutical Sciences, Lovely Professional University for giving his support to proceed my project work.

I am very grateful to “**Dr. Monica Gulati**” Senior Dean Lovely School of Applied Medical Sciences, Lovely Professional University whose continuous guidance helped me a lot to face many problems during my project work.

I would like to thank my parents “**Mr. Jai Sukh Lal Bhatia**” and “**Mrs. Dwaraka Bhatia**” who have always been with me. It was due to my parent’s dream, ambition, and sacrifice that I get so much ability to face all challenges during my research work today. I would like to express my heartiest gratitude to my friends “**Anil Kumar Sah, Shivangni Raj ,Preeti Kalsi, Saveena Chauhan, Arun Kumar, Swati Sharma, Sweta pathyarach, and Ambika Thakur,**” as without their love and support it would not have been possible to complete the task.

Words will fall short to express my feelings for my parents and my guide. They are the soul of my energy and motivation. Their blessings have tolead me towards achieving my goals.

INDEX

S.No.	Content	Page No.
1	Introduction	1
2	Terminology	2
3	Literature Review	3-29
	3.1 Vati Kalpana	3
	3.1.1 Synonyms of Vati Kalpana	3
	3.1.2 Advantages of the Vati Kalpana	3
	3.1.3 Disadvantages of the Vati kalpana	3
	3.2 Avaleha Kalpana	3
	3.2.1 Etymology	4
	3.2.2 Derivation	4
	3.2.3 Definition	4
	3.2.4 Synonyms	4
	3.2.5 Dravya used for the preparation of the avaleha	4
	3.2.5.1 Madhura dravya	4
	3.2.5.2 Prakshepa dravya	4
	3.2.5.3 Drava dravya	4
	3.2.5.4 Kalka dravya	5
	3.2.6 Pharmaceutical procedure	5
	3.2.6.1 Purva Karma	5
	3.2.6.2 Pradhan Karma	5
	3.2.6.3 Paschat karma	5
	3.2.7 Avaleha Siddhi Lakshana	5
	3.2.7.1 Asannapakva Avastha Lakshna	6
	3.2.7.2 Supakva Avastha Lakshana	6
	3.2.8 Storage	6
	3.2.9 Dose	6
	3.2.10 Importance of avaleha kalpana	7

	3.3 Granules	7
	3.3.2 Advantages of Granules	7
	3.3.3 Method of preparation of granules	7
	3.3.3.1 Wet granulation	7
	3.3.3.2 Dry granulation	7
	3.3.3.3 Fluid bed Granulation	8
	3.4 Eladi gutika	8
	3.4.1 Charaka Samhita	8
	3.4.2 Yogtarangin	8
	3.4.3 Rasatantrasara and sidhyogsanghra	8
	3.4.4 Bhaishjaya Ratnavali	8
	3.5.1 Method of preparation of Eladi Gutika	9
	3.6 Yastimadhu	9
	3.6.1 Vernacular names	9
	3.6.2 Geographical source	10
	3.6.3 Botanical description	10
	3.6.4 Macroscopical characters	10
	3.6.5 Microscopically characters	10
	3.6.6 Identity, Purity and strength	10
	3.6.7 Chemical constituents	11
	3.6.8 Ayurvedic properties	11
	3.6.9 Therapeutic purposes	11
	3.7 Munnaka	12
	3.7.1 Vernacular names	12
	3.7.2 Geographical source	12
	3.7.3 Botanical description	12
	3.7.4 Macroscopical characters	13
	3.7.5 Microscopical characters	13
	3.7.6 Identity, Purity and Strength	13
	3.7.7 Chemical constituents	14

	3.7.8 Ayurvedic properties	13
	3.7.9 Therapeutic purposes	14
	3.8 Ela	14
	3.8.1 Vernacular names	14-15
	3.8.2 Geographical source	15
	3.8.3 Botanical description	15
	3.8.4 Macroscopical characters	15
	3.8.5 Microscopical Characters	15
	3.8.6 Identity, Purity and strength	15
	3.8.7 Chemical constituents	16
	3.8.8 Ayurvedic properties	16
	3.8.9 Therapeutic purposes	16
	3.9 Tvak	17
	3.9.1 Vernacular names	17
	3.9.2 Geographical source	17
	3.9.3 Botanical description	17
	3.9.4 Macroscopical Characters	18
	3.9.5 Microscopical Characters	18
	3.9.6 Identity, Purity and strength	18
	3.9.7 Chemical Constituents	19
	3.9.8 Ayurvedic properties	19
	3.9.9 Therapeutic purposes	19
	3.10 Tejpatra	19
	3.10.1 Vernacular names	20
	3.10.2 Geographical source	20
	3.10.3 Botanical description	20
	3.10.4 Macroscopical characters	20
	3.10.5 Microscopical characters	20
	3.10.6 Ayurvedic Properties	21
	3.10.7 Therapeutic Purposes	21

	3.11 Pippali	22
	3.11.1 Vernacular names	22
	3.11.2 Geographical source	22
	3.11.3 Botanical description	22
	3.11.4 Macroscopical characters	23
	3.11.5 Microscopical characters	23
	3.11.6 Identity, Purity and Strength	23
	3.11.7 Ayurvedic properties	23
	3.11.8 Therapeutic purposes	23
	3.12 Kharjura	24
	3.12.1 Vernacular names	24
	3.12.2 Geographical source	25
	3.12.3 Botanical description	25
	3.12.4 Macroscopical characters	25
	3.12.5 Microscopical characters	25
	3.12.6 Identity, Purity and Strength	25
	3.12.7 Ayurvedic properties	26
	3.12.8 Therapeutic purposes	26
	3.13 Madhu	26
	3.13.1 Vernacular names	27
	3.13.2 Identity, Purity and strength	27
	3.13.3 Chemical constituents	28
	3.13.4 Ayurvedic properties	28
	3.13.5 Therapeutic purposes	28
	3.14 Mishri	28
	3.14.1 Vernacular names	29
	3.14.2 Description	29
	3.14.3 Therapeutic purposes	29
4	Need of the study	30
5	Aim and Objectives	31

	5.1 Aim	31
	5.2 Objective	31
6	Material and Research Methodology	32
	6.1 List of Equipment used	32
	6.2 Chemical used	33
	6.3 Research Methodology	34
7	Experimental works	35
	7.1 Procurement of the raw material	35
	7.2 Authentication of the drugs	35
	7.3 Analysis of raw materials	35
	7.3.1 Organoleptic evaluation of raw material	35
	7.3.2 Physicochemical evaluation of herbal raw materials	35
	7.3.2.1 Foreign matter	35
	7.3.2.2 Loss on Drying	35
	7.3.2.3 Total ash	35
	7.3.2.4 Acid Insoluble Ash	36
	7.3.2.5 Water soluble Ash	36
	7.3.2.6 Alcohol soluble extractive	36
	7.3.2.7 Water soluble extractive	36
	7.3.3 Qualitative Analysis of herbal raw material	36
	7.3.3.1 Test for Alkaloids	36
	7.3.3.2 Tests for saponin glycosides	36
	7.3.3.3 Test of reducing sugar	37
	7.3.3.4 Tests for monosaccharide's	37
	7.3.3.5 Tests for amino acids	37
	7.3.3.6 Test for Steroids	37
	7. 4 Analysis of honey	37
	7.4.1 Determination of pH	37
	7.4.2 Total solid content	37
	7.4.3 Ash value	38

	7.4.4 Reducing sugar	38
	7.4.5 Density measurement	38
	7.5 Analysis of cow's ghee	38
	7.5.1 Organoleptic characters of cow's ghee	38
	7.5.2 Physicochemical evaluation of cow's ghee	38
	7.5.2.1 Specific gravity	38
	7.5.2.2 Refractive index	38
	7.5.2.3 Determination of saponification value	39
	7.5.2.4 Determination of acid value	39
	7.5.2.5 Determination of peroxide value	39
	7.6 Preparation of formulations	40
	7.6.1 Preparation of eladi gutika	40
	7.6.1.1 Before process	40
	7.6.1.2 During process	41
	7.6.1.3 After process	41
	7.6.2 Preparation of avaleha	41
	7.6.2.1 Before Process:	41
	7.6.2.2 During Process	42
	7.6.2.3 After process	42
	7.6.3 Preparation of granules	42
	7.6.3.1 After process	42
	7.7 Analysis of finished products	43
	7.7.1 Analysis of eladi gutika	43
	7.7.1.1 Determination of pH	43
	7.7.1.2 Loss on drying	43
	7.7.1.3 Total Ash	43
	7.7.1.4 Acid insoluble ash	43
	7.7.1.5 Water soluble Ash	43
	7.7.1.6 Water soluble extractive value	43
	7.7.1.7 Alcohol soluble extractive value	43

	7.7.1.8 Weight variation	43
	7.7.2 Analysis of avaleha	44
	7.7.2.1 Total Ash	44
	7.7.2.3 Acid insoluble ash	44
	7.7.2.4 Determination of pH	44
	7.7.2.5 Total solid	44
	7.7.2.6 Fat content	44
	7.7.3 Analysis of granules	44
	7.7.3.1 Loss on drying	44
	7.7.3.2 Total Ash	44
	7.7.3.3 Acid insoluble ash	45
	7.7.3.4 Water soluble Ash	45
	7.7.3.5 Water soluble extractive value	45
	7.7.3.6 Alcohol soluble extractive value	45
	7.7.3.7 Angle of repose	45
	7.7.3.8 Bulk density	45
	7.8 TLC	45
	7.8.1 Preparation of sample	46
	7.8.2 Chromatographic conditions	46
	7.9 HPTLC	46
	7.10 DPPH Assays	46
8	Result and Discussion	47-71
	8.1 Analysis of raw drugs	47
	8.1.1 Organoleptic Study of raw materials	47
	8.1.2 Physicochemical parameters of raw materials:	48
	8.1.2.1 Physicochemical analysis of yastimadhu:	48
	8.1.2.2 Physicochemical analysis of tvak:	48
	8.1.2.3 Physicochemical analysis of tejpatra	49
	8.1.2.4 Physicochemical analysis of munnaka	49
	8.1.2.5 Physicochemical analysis of kharjura:	50

	8.1.2.6 Physicochemical analysis of ela	50
	8.1.2.7 Physicochemical analysis of pippali:	51
	8.1.2.8 Physicochemical analysis of honey	51
	8.1.2.9 Physicochemical analysis of cow's ghee	52
	8.1.3 Qualitative analysis of raw materials	52
	8.2 Preparation of Eladi gutika	53
	8.2.1 Ingredients of Eladi Gutika	53
	8.2.2 Preparation of powders	53
	8.2.3 Preparation of paste	55
	8.2.4 Trituration with honey	55
	8.3 Preparation of Avaleha	56
	8.3.1 Preparation of powders	56
	8.3.2 Preparation of paste	58
	8.3.3 Preparation of kwatha	58
	8.3.4 Preparation of sugar syrup	60
	8.3.5 Yield of avaleha	60
	8.4 Preparation of Granules	60
	8.4.1 Ingredients of granules	60
	8.4.2 Preparation of powders	61
	8.4.3 Preparation of pastes	62
	8.4.4 Results of granules preparation	63
	8.5 Analysis of finished products	63
	8.5.1 Pharmaceutical analysis of eladi gutika	63
	8.5.1.1 Organoleptic study of eladi gutika	63
	8.5.1.2 Physicochemical analysis of eladi gutika	64
	8.5.2 Pharmaceutical analysis of Avaleha	64
	8.5.2.1 Evaluation parameters of Kwatha	64
	8.5.2.2 Organoleptic study of Avaleha	65
	8.5.2.3 Physicochemical study of avaleha	66

	8.5.3 Analysis of granules	66
	8.5.3.1 Organoleptic study of granules	66
	8.5.3.2 Physicochemical study of granules	67
	8.6 Qualitative analysis of gutika, avaleha, and granules	67
	8.7 Chromatographic analysis of Eladi Gutika , Avaleha, Granules	69
	8.7.1 HPTLC profile	70
	8. 8 Anti-oxidant activities of Gutika, Avaleha, Granules	71
	8.8.1 Antioxidant activity of Eladi gutika granules	71
	8.8.2 Graphical representation: Antioxidant activity of the Eladi gutika	71
9	Conclusion and future scope	73
10	References	74
11	Appendix	80

List of tables

Table no	Content	Page no
3.1	Asannapakva Avastha Lakshana of Avaleha	6
3.2	Supakva Avastha Lakshana of Avaleh	6
3.3	Ingredients of eladi gutika	8
3.4	Ayurvedic literature of yastimadhu	11
3.5	Ayurvedic literature of munnaka	13
3.6	Ayurvedic literature of Ela	16
3.7	Ayurvedic literature of tvak	18
3.8	Ayurvedic literature of Tejpatra	21
3.9	Ayurvedic literature of Pippali	23
3.10	Ayurvedic literature of Kharjura	25
3.11	Ayurvedic literature of Madhu	27
3.12	Ayurvedic literature of Mishri	29
6.1	List of Equipment used	32
7.1	Ingredients of eladi gutika	40
8.1	Observation of organoleptic study of raw drug materials	47
8.2	Observation of organoleptic study of raw drug materials	47
8.3	Observation of physicochemical study of Yastimadhu	48
8.4	Observation of physicochemical study of Tvak	48
8.5	Observation of physicochemical study of Tejpatra	49
8.6	Observation of physicochemical study of Munnaka	49
8.7	Observation of physicochemical study of Kharjura	50
8.8	Observation of physicochemical study of Ela	50
8.9	Observation of physicochemical study of pippali	51
8.10	Observation of physicochemical study of Honey	51
8.11	Observation of physicochemical study of ghee	52
8.12	Observation of phytochemical study of raw drug material	52
8.13	Quantity of ingredients to prepare the Eladi gutika	53
8.14	Observation of powdered raw material all batches	53

8.15	Quantity of ingredients for preparation of paste	55
8.16	Observations during the mixing of the powdered drugs	55
8.17	Quantity of the ingredients for the preparation of Avaleha	56
8.18	Observations during preparation of powders	56
8.19	Quantity of ingredients for preparation of paste	58
8.20	Observation parameter for kwatha	58
8.21	Ingredients of sugar syrup	59
8.22	Final yield of avaleha	60
8.23	Ratio of ingredients of Granules	60
8.24	Observation during preparation of powders	61
8.25	Quantity of ingredients for preparation of paste	62
8.26	Results of the granules preparation	63
8.27	Observation of organoleptic parameters of eladi gutika	63
8.28	Physicochemical evaluation of eladi gutika	64
8.29	Evaluation Parameters of Kwatha	64
8.30	Organoleptic observation of Avaleha	65
8.31	Physicochemical analysis of Avaleha	66
8.32	Observation of organoleptic evaluation of granules	66
8.33	Observation of physicochemical analysis of granules	67
8.34	Phytochemical evaluation of Gutika , Avaleha, Granules	68
8.34	Rf .values Of Formulation	69

List of figures

Fig.no.	Content	Page no
1	Roots of Glycyrrhiza	9
2	Fruits of munnaka	12
3	Fruits of Ela	14
4	Bark of Tvak	17
5	Leaves of Tejpatra	19
6	Fruits of pippali	22
7	Fruits of Kharjura	24
8	Honey	26
9	Mishri	28
10	TLC of avaleha ,gutika,granules in long U.V (before application of spraying)	69
11	HPTLC plate of finished products	70

LIST OF ABBREVIATIONS

API	–	Ayurvedic Pharmacopoeia of India
Sr.No	–	Serial number
Ref.No	–	Reference number
mg.	–	Milligram
g.	–	Gram
Fig	–	Figure
Std.	–	Standard
ml.	–	Milliliter
µg	–	Microgram
Conc.	–	Concentration
DPPH	-	2, 2-diphenyl-1-picrylhydrazyl

ABSTRACT

Vati kalpana is the widely accepted dosage form of ayurveda for the different therapeutic purposes because it is prepared by converting polyherbal and herbomineral combinations in a single dose. However, vati kalpana has some pharmaceutical and therapeutical drawbacks. Pharmaceutical problems are generally related to the friability, cracking, chipping, mottling, disintegration and dissolution. Moreover, vati cannot be prescribed to all age groups due to the problems related to the administration, high dose and palatability. Eladi gutika is one of such formulation which has relatively high dose i.e. 10 gm. Therefore, the present study was designed to prepare alternate dosage forms for the eladi gutika. Therefore, avaleha and granules were prepared and compared with eladi gutika for their efficacy. Five batches for each formulation were prepared to standardize the process by using same ingredients. The average yields of eladi gutika, avaleha and granules were 79.44 %, 78.11 % and 69.44 % respectively. In HPTLC profile of eladi gutika, avaleha, and granules only one common R_f was found i.e. 0.07. In-vitro anti-oxidant activity revealed that granules and avaleha are more effective than eladi gutika.

Key words: Vati, Ayurveda, Pharmaceutical

CHAPTER-I

1.1 Introduction

Aushadhi is the one of the important tool of ayurveda to fulfill its aim i.e. maintain the health of individual and cure the patients. Aushadhi generally comprises formulations prepared by the single and multiple drugs. The branch of ayurveda which deals with the preparation of the formulations is known as rasashastra and bhaishajya kalpana. These formulations are classified as primary and secondary kalpana. Primary kalpana include panchavidha kashaya kalpana and secondary formulations include preparations developed by using panchavidha kashaya kalpana as an ingredient (swarasa, kalka, kwatha, hima, phanta)¹. Secondary formulations were developed to enhance the shelf life, palatability, safety, efficacy, and bioavailability of the drugs. Moreover, it also helps to reduce the dose of the ingredients.

Vati kalpana is the widely accepted dosage form of ayurveda for the different therapeutic purposes because it is prepared by converting polyherbal and herbomineral combinations in a single dose. However, vati kalpana has some pharmaceutical and therapeutical drawbacks. Pharmaceutical problems are generally related to the friability, cracking, chipping, mottling, disintegration and dissolution². Moreover, vati cannot be prescribed to all age groups due to the problems related to the administration, high dose and palatability. Therefore, there is need to develop alternate dosage forms for the vati kalpana to increase their acceptability.

CHAPTER-II

TERMINOLOGY

- Standardization** Standardization of drug is defined as authentication of its identity, determination of quality, purity and detection of nature of adulterant by various parameters like morphological, microscopical, physical, chemical and biological evaluations.
- Gutika** Medicine rolled into small circular shape, then it is known as gutika. In modern pharmaceuticals, it is compared with the pills.
- Avaleha** Avaleha, rasakriya are the semisolid to the solid forms of the medication. In this, aqueous solutions are concentrated with or without the addition of sweetening agents with help of heat.
- Granules** Granules are the multiparticle entities in which primary powder particles are made to adhere to form large particle.
- Antioxidant** The substance that inhibit oxidation.

CHAPTER-III

3. Literature Review

3.1 Vati Kalpana

Vati kalpana is solid medication, made from the one or more powdered drugs of plants, mineral and animal origin. Medicine which is prepared in the form of pills and tablet is called as gutika and vati kalpana³.

3.1.1 Synonyms of Vati Kalpana⁴:

- **Gutika:** If the medicine is rolled into small circular shape, then it is known as gutika. In modern pharmaceuticals, it is compared with the pills⁵.
- **Vati:** Vati is made into the circular mass. It can be similar to the tablet.
- **Guda:** If the powdered drug is mixed with the guda paka then the final product is called Guda.
- **Modaka:** Modaka having big size. It is around 20 gm, 50 gm, 100 gm. Modaka having circular shape.

3.1.2 Advantages of the Vati Kalpana⁵:

- It makes easy administration of drugs as compared to the other dosage forms.
- The cost of vati is lowest among all the oral dosage forms.
- Vati is the unit dosage form it offers greatest dose precision and least content variability.
- Packing of the vati is easy and cost effective.

3.1.3 Disadvantages of the Vati kalpana⁵:

- Vati having slow dissolution property.
- Administration of high dose of vati is difficult.
- Drugs which having the bitter odour or which are sensitive towards the moisture cannot be rolled into the pills.
- In vati kalpana, if mixing of the binder is not done properly then it may result into the therapeutic inactive medication.

3.2 Avaleha Kalpana

Avaleha are semisolid forms of medicaments used for the internal administration. Avalaha is a broad term that includes rasakriya, avalaha, phanita, khanda, ghana and modaka. All these formulations are having the common pharmaceutical procedure with slightly

difference in their specification. These formulations are converted to the semisolid form by evaporating the liquid content.

3.2.1 Etymology⁶:

The substances which are neither too thin or nor too thick, and can be licked easily is called as leha.

3.2.2 Derivation⁶:

Word avaleha is prepared from the 'liha' and 'asavadane'. Avalaha denotes the route of administration.

3.2.3 Definition⁶:

Avaleha, rasakriya are the semisolid to the solid forms of the medication. In this, aqueous solutions are concentrated with or without the addition of sweetening agents with help of heat.

3.2.4 Synonyms⁷:

According to Acharya Sharangdhara, leha and avaleha are the synonyms of the rasakriya

3.2.5 Dravya used for the preparation of the avaleha:

3.2.5.1 Madhura dravya:

Sharakara, guda are used for the sweetening purpose. Madhu has been used for its adjuvant property.

3.2.5.2 Prakshepa dravya⁶:

Addition of the prakshepa dravya is made to enhance therapeutic efficacy of pharmaceutical preparation. They act as adjuvant and provide better odour and good taste to formulation. Some prakshepa dravya having properties like: ushna, tikshna which have role to promote the Agni, indirectly helps in absorption and metabolism of active principles. Along with above properties they also act as preservative due to their antimicrobial properties.

3.2.5.3 Drava dravya:

It includes both Sneha (Ghrita ,Taila) and Asneha Dravya (Swarasa, Kwath, Hima, and Phanta).Sneha dravya are used for the frying purpose⁸.

3.2.5.4 Kalka dravya:

Some formulations mentioned in the classics contain pulp of raw material e.g. Kutajavaleha⁹. Acharya Todarmalla opine to use the pulp in ¼ quantity with respect to liquid material.

3.2.6 Pharmaceutical procedure: It includes the following steps:

- Purva karma (before processing)
- Pradhan karma (during processing)
- Paschat karma (after processing)

3.2.6.1 Purva Karma:

- Swarasa used for preparation of avaleha kalpana should be in fresh form.
- If, kalka (pulp) is mentioned, then it should be properly fried with sneha drava till the appearance like Madhu.
- If, prakesha dravya has to be added in the medication, it should be in fine powder.

3.2.6.2 Pradhan Karma:

Generally, Kwatha is used as drava dravya:

For the addition of madhura dravya into the kwath then it should be used in the fresh form and heat is to be applied till asanna pakvavastha appears. Uniform and mild heat is to be applied with persistent stirring to prevent caramelization of sweetening agents.

3.2.6.3 Paschat karma:

Adjuvants are added in slightly hot condition. Addition of adjuvant in cool stage leads to formations of lumps due to improper mixing. During cooling, sugar molecules become close with each other which increase thickness of sugar solution, which hamper the homogenous mixing process. Then avaleha must be stored in an airtight, moisture free container with proper labeling and packaging.

3.2.7 Avaleha Siddhi Lakshana:

Siddhi lakshana not only indicates the different stages of pharmaceutical procedure but also quality of the final product.

Stages of sidhi lakshana:

- Asannapakva Avastha
- Supakva Avastha

3.2.7.1 Asannapakva Avastha Lakshna

These signs indicate concentration of sweetening agents in liquid material, which directly influences the final form of medicaments. In short, these signs mark the time to stop heating and to add adjuvants, depending upon nature of medicaments. e.g. avaleha, khanda, modaka etc.

Table 3.1: Asannapakva Avastha Lakshana of Avaleha⁶

Sr.no	Signs	Illustration
1	Darvi Pralepatva	Stickiness of Sugar solution to ladle
2	Tantummatvam	Thread like consistency.
3	Appasu Majjanam with Saranam	Settling downing water & spread
4	Appasu Majjanam with Sthiratva	Settling down in water without spread
5	Patitastu Na Shiryate	When drop is poured over surface, it does not spread or break.

3.2.7.2 Supakva Avastha Lakshana⁶:

These signs mark the organoleptic characters of final form of leha i.e. after addition of Prakshep dravya, sneha and madhu.

Table 3.2: Supakva Avastha Lakshana of Avaleha

Sr. No	Signs	Illustration
1	Sukh sparsha	Soft to touch
2	Sukh marda	Feels soft even after rubbing between finger
3	Gandha, Varna, Rasattapoti	having taste, color, smell as that of ingredients

3.2.8 Storage:

Avaleha should be preserved in plastic containers and there should be little gap between lid and material. The vessel should be tightly packed. Acharya Sharanagdhara has mentioned its self-life one year.

3.2.9 Dose¹⁰:

The dose of Avaleha mainly depends upon roga bala and rogi bala.

3.2.10 Importance of avaleha kalpana⁶:

- It has longer shelf - life in comparison to few other dosage forms.
- It has good palatability due to the addition of sweetening agents.
- Avaleha having the nutritive property and therapeutic values.
- Rapid absorption.
- Action starts from the mouth its self.
- Avaleha having the rich dietic values because it contains glucose and other sweetening agents.

3.3 Granules ¹¹:

3.3.1 Defination:

Granules are multiparticle entity of the fine particles of powdered drug materials, generally having free flowing particles. Granules are having irregular shape. These typically lies in the range of 850 µm (20#) to 4.75 mm (4#).

3.3.2 Advantages of Granules:

- Improves the compressibility of powders.
- Granules having better flow property as compared to the powders.
- Better content uniformity.
- Granules having high porosity.
- Granules are physically and chemically more stable because of small surface area .
- Granules are also used to make the solutions. Because it gets easily wetted by the solvents.

3.3.3 Method of preparation of granules:

3.3.3.1 Wet granulation:

In this method, firstly liquid binder or an adhesive are added to the mixture of powders. Wetted mass is allowed to pass through the desired mesh aperture and then at last granules are dried. Dried granules are further screen through smaller mesh aperture to obtained smaller size. In wet granulation 10-20% aqueous solution of corn and 25-30% of glucose solution, cellulose is used as binding agent.

3.3.3.2 Dry granulation: By this method granules are prepared by compacting large masses of the powder mixture and subsequently crushing into pieces .Crushed pieces are sized into

smaller size granules. This method of granulation is preferred where wet granulation is not applicable.

3.3.3.3 Fluid bed Granulation:

In this method, a granulating solution is sprayed into the suspended particles that are dried rapidly with the help of suspending air.

3.4 Eladi gutika:

3.4.1 Charaka Samhita¹²

According to Charaka Samhita, chikitsasthanam, ingredients, dose and uses of the Eladi guttika are mentioned.

3.4.2 Yogtarangini¹³

In Yogtarangini, ingredients, quantity and its uses for the treatment of ailments including; kasa, swasa, jvara, vaman (vomiting), shula (pain) and amavata. Dose: 2 tola

3.4.3 Rasatantrasara and sidhyogsanghra¹⁴

Ingredients, anupan, and dose have been mentioned.

3.4.4 Bhaishjaya Ratnavali¹⁵

Method of preparation, dose, and uses has been mentioned.

Table 3.3: Ingredients of eladi gutika

Sr.no	Common name	Scientific name	Family	Part Used
1	Yastimadhu	<i>Glycyrrhiza glabra</i>	Leguminoceae	Roots
2	Ela	<i>Elettaria cardamomum</i>	Zingiberaceae	Seeds
3	Tvak	<i>Cinnamomum zeylanicum</i>	Lauraceae	Bark
4	Munnaka	<i>Vitis venifera</i>	Vitaceae	fruits
5	Tejpatra	<i>Cinnamomum tamala</i>	Lauraceae	Leaves
6	Pippali	<i>Piper longum</i>	Piperaceae	Fruits
7	Kharjura	<i>Phoenix dactlifera</i>	Palmae	Fruits
8	Madhu	<i>Apis melifera</i>	Apidae	-
9	Mishri	Rock candy	-	-

3.5.1 Method of preparation of Eladi Gutika ¹⁵:

- Make powder of all the ingredients of eladi gutika except kharjura and munnaka.
- Pass all the powdered ingredients through sieve.
- Grind munnaka and kharjura separately
- Mix all the ingredients properly and add honey.
- Make vati of one tola.

3.6 Yastimadhu



Fig 1 Roots of Glycyrrhiza

Botanical Name : *Glycyrrhiza glabra, Linn* ¹⁶

Family : Leguminoceae

3.6.1 Vernacular names¹⁶:

Sanskrit : Yastimadhuka, Yastika, Madhuka, Maddhuyasti

English : Liquorice root

Hindi : Mulethi, Mulathi, Jethimadhu, Jethimadh

Gujrati : Jethimadha, jethimard, jethimadh

Kashmiri : Multhi

Telugu : Atimadhurams

Punjabi : Mulathi, jethimadh

3.6.2 Geographical source: It is distributed in the Asian region mainly in the central and south region also in the Mediterranean region. It is cultivated in Persia, Europe, and Afghanistan¹⁶.

3.6.3 Botanical description¹⁷: Glycyrrhiza is hard herb or under shrub, growing to height of 1.8 meter. The plant consists of the dried, peeled and unpeeled underground stems and roots.

Roots: Its roots are thick, branched. Externally roots appear lemon colour and yellowish to pale yellows internally.

Leaves: Imparipinnate, multifoliate constitute 4-7 pairs of leaflets, ovate –lanceolate and smooth.

Flowers: Flowers are light blue to violet colour¹⁸.

Fruits: Fruits are glabrous and compressed legume, fruiting occurs in the August Month.

Seeds: Its seeds are flat, deep gray.

3.6.4 Macroscopical characters¹⁶:

Externally stolons are yellowish brown or dark brown colour and having the longitudinal wrinkled. Roots are long peeled and unpeeled cylindrical pieces. The roots are having the characteristics odour. Roots are sweet in taste. Fracture of the root is fibrous type.

3.6.5 Microscopically characters¹⁶:

Stolon: The Transverse section of the stolon shows cork of 10-20. Its outer layer is having reddish -brown amorphous content and inner three or four rows having the colorless walls. Secondary cortex is arranged radially. It also contains isolated prisms of calcium oxalate, secondary phloem.

Roots: The transverse section of the roots shows the structures that resembles with the stolon except the medulla is present, xylem tetrarch, usually 4 principal medullary rays at the rightangled to each other. Peeled drug cork shows phelloderm and sometimes without secondary phloem all parenchymatous tissues containing abundant, simple, oval arrounded starch grains of 2-20 micron in length.

3.6.6 Identity, Purity and strength¹⁶:

Total ash	:	Not > 10%
Alcohol Soluble Extractive Value	:	Not < 10%
Acid insoluble ash	:	Not > 2.5%
Water soluble extractive	:	Not < 20%

Table 3.4 Ayurvedic literature of yastimadhu

Classical text	Description
Charaka Samhita¹⁹	Vamnopag Sandhaneya mahakashya Kandughana mahakashya Varnya mahakashya Aasthapanopag mahakasya Angamardaprashmanm mahakashya
Sushruta Samhita²⁰	Pittabhishyanda
Bhavapraksha Niganthu²¹	Haritakyadi varga
Raj Niganthu²²	Pippalyadi varga
API¹⁶	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses

3.6.7 Chemical constituents

Glycyrrhizin (principle responsible for the sweetness), isoliquirtin, glycyrrhizic acids, isoliquiritin, glucose, mucilage, sulphuric acid²³

3.6.8 Ayurvedic properties¹⁶

Rasa	:	Madhur
Guna	:	Snigdha, Guru
Veerya	:	Sheet
Vipaka	:	Madhur
Karma	:	Reduces vata and pitta, balya

3.6.9 Therapeutic purposes^{24,25,26}.

- Beneficial in respiratory health (cough, bronchitis, asthma)
- It is used in the hair and skin disorder like: hair loss and grey hairs, eczema
- Yastimadhu powder mixed with milk is prescribed for promoting the lactation.
- Glycyrrhiza possess the emollient and soothing property.
- It is beneficial in relieving the pain due to the ulcers
- Used for netra roga.
- Decoction has been used for the weight loss

3.7 Munnaka



Fig 2: Fruits of munnaka

Botanical name : *Vitis vinifera, Linn.*²⁷

Family : Vitaceae

3.7.1 Vernacular names²⁷:

Sanskrit : Mrdvika, Gostani

Assamese : Munaqqa, Dakh

Bengali : Maneka

English : Raisins, Dry Grapes

Gujrati : Drakh, Darakh

Hindi : Munkka

Punjabi : Munaca

Urdu : Munaqqa

3.7.2 Geographical source: It is cultivated throughout in India²⁸.

3.7.3 Botanical description: It is a climber and having light green coloured flower.

Munnaka: It is a dried dark coloured grape. These are having the wrinkled surface from the outer side and sticky from the inner side.

3.7.4. Macroscopical characters²⁷: Munnaka fruits are sticky, pulpy, oval or oblong, size vary from 1.5 to 2.5 cm long and 0.5-1.5 broad, dark brown to black colour. Its outer surface is irregular, having sweetish, pleasant odour.

3.7.5 Microscopical characters²⁷: Fruits having three layers epicarp, mesocarp, and endocarp. Epicarp section shows several unicellular and pointed hairs. Mesocarp consists of 3-5 layers, which are oval to polygonal in shape, elongated parenchymatous cells, a few vascular bundles and tannins cells found in this region. Endocarp consists of two to three layers, having round to oval shape, striations and narrow lumen. Colorless cells are embedded in the endosperm, which contains oil globules.

Powder: Colour of the powder is Brown. The powder microscopy shows fragment of thin walled, oval to polygonal parenchymatous cells of endosperm, tanniferous oil globules, unicellular hairs, thick walled, polygonal, sclerenchymatous, polygonal cells of testa.

3.7.6 Identity, Purity and Strength²⁷:

Foreign matter	:	Not > 1%
Total ash	:	Not > 9%
Alcohol -soluble extractive	:	Not < 10 %
Water- soluble extractive	:	Not >13%
Acid-insoluble ash	:	Not > 1 %

Table 3.5 Ayurvedic literature of munnaka

Classical text	Description
Charak Samhita²⁹	Virachnopag Javarhara mahakashya Shramhara mahakashya Phala varga
Sushruta Samhita³⁰	Pittabhishtyanda
Dhanvantri Nighantu³¹	Aamradi varga
API²⁷	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses

3.7.7 Chemical constituents: Vitamin C, citric acid, carotene, tartaric acid, malic acid, sodium and potassium chloride, Magnesium²⁸.

3.7.8 Ayurvedic properties²⁷:

Rasa : Kasaya, Amla

Guna : Ruksha, Laghu

Veerya : Ushana

Vipaka : Amla

Karma : Dipana, Grahi, Kaphahara, Vatahara, Rucikara, Pittakara.

3.7.9 Therapeutic purposes^{32,33,34}

- Kamala (jaundice), mutrakricha
- Antioxidant and anti-inflammatory property.
- Effective in constipation.
- Effective in the weight loss.
- It is beneficial for the bones disorders as the fruits are rich source of calcium.

3.8 Ela



Fig.3 Fruits of Ela

Botanical Name : *Elettaria cardamom, Marton.*³⁵

Family : Zingiberaceae

3.8.1 Vernacular names³⁵

Sanskrit : Ela, Truti

Hindi : Choti ilayachi

English	:	Cardamom
Assamese	:	Saroplaachi
Kashmiri	:	Kath
Bengali	:	Chota elaich
Gujrati	:	Choti elachi
Telugu	:	Yelekapalu

3.8.2 Geographical source: In India it is cultivated in different parts mainly in Western Ghats and South India. It is native to Sri Lanka³⁶.

3.8.3 Botanical description: Cardamom is a perennial herbaceous, rhizomatous plant having 2-3 m height³⁷.

Leaves: Cardamom having pointed leaves, green coloured with Smooth surface.

Flowers: Flowers are shortly pickled, membranous, shortly lobed, white coloured sheath with a pinkish striped. Flowering occurs In May to July month.

Fruits: Its fruits are oblong, ovoid, light green colour. It size varies from 1-2 cm. Outer surface of the fruits having striations. Fruiting takes place in the May to July month

Seeds: Ripe seeds are dark reddish-brown colour and unripe seeds are pale colour.

3.8.4 Macroscopical characters³⁵:

Fruit: Greenish to pale yellow coloured flower 1-2 cm. Its apex is shortly beaked and base is rounded or pedicel. Fruits contains about 15-20 seeds. Seeds are arranged compact fully and form a compact mass.

Seeds: Seeds are 4mm long and 3 mm broad. These are dark brown to black colour.

3.8.5 Microscopical Characters³⁵:

In the transverse section of the seeds following Structures are present. These include thin walled parenchymatous cells; testa is covered by the thick epidermis, volatile oils. Beaker shaped cells are present at the outer palisade sclerenchyma. It also contains starch grains, calcium oxalate crystals and in the pericarp section large vessels are present.

3.8.6 Identity, Purity and strength³⁵:

Total ash	:	Not > 6 %
Acid-insoluble ash	:	Not > 4 %
Water- soluble extractive	:	Not < 10%
Alcohol -soluble extractive	:	Not < 2 %
Volatile oil	:	Not < 4%

Table 3.6 Ayurvedic literature of Ela

Classical text	Description
Charak Samhita³⁸	Vamnopag Shiroverachan Angmardprashmanm mahakashya
Sushruta Samhita³⁹	Pittabhishyanda
Bhavapraksha Nighantu⁴⁰	Kapooradi varga
Nighantu Aadarsh⁴¹	Eladi verga
API³⁵	Synonyms, description, characteristics, Identity, purity and strength, constituents, properties, actions, formulation, uses
Priyanighantu⁴²	Haritakyadi verga

3.8.7 Chemical constituents: It contains volatile oil, pinene, eucalyptone⁴³.

3.8.8 Ayurvedic properties³⁵:

Rasa	:	Madhur, Katu
Guna	:	Laghu, Ruksha
Virya	:	Sheeta
Vipaka	:	Madhur
Doshkarma	:	It is tridoshara

3.8.9 Therapeutic purposes^{44,45}

- Its use has been mentioned by Shusruta in the treatment of the bloodletting with combination of the others drugs like: siasiva, kusta.
- To treat the mukh roga .
- It has been used as flavoring agent.
- In Yogtarangini ela is the one of the ingredient of the eladiguttika.
- Rochan, pachan and Anuloman.
- Used in the preparation of tincture

3.9 Tvak



Fig.4 Bark of Tvak

Botanical Name : *Cinnamomum zeylanicum, Breyn*⁴⁶

Family : Lauraceae

3.9.1 Vernacular names⁴⁶:

Sanskrit : Darusita

Hindi : Dalchini

Assamese : Dalcheni

English : Cinnamon bark

Bengali : Daruchini, Daruchini

Gujrati : Dalchini

Kashmiri : Dalchini, Dalchin

Marathi : Dalchini

Urdu : Darchini

Punjabi : Dalchini, Guda Twak

3.9.2 Geographical source: Cinnamon is cultivated in the Brazil and Indonesia. Largest quantity of the cinnamon is mainly cultivated in the Shrilanka. Cinnamon is native to china⁴⁷.

3.9.3 Botanical description: It is a small size evergreen tree attaining height of 6.1-7.6.

Leaves: Leaves are coriaceous, green at the upper side and having spicy odour.

Flowers: Plant having small flowers which having the disagreeable smell.

Fruits: dark purple coloured, size vary from 1.3 to 2.5 cm. Flowering takes place during the spring season.

3.9.4 Macroscopical Characters⁴⁶: Dull yellowish-brown coloured bark from the outer side and dark from the inner side. Thickness of the bark is 0.5 mm. At the outer surface small scars and holes are present. Fracture is short. It has a sweet fragrant odour and sweet taste.

3.9.5 Microscopical Characters⁴⁶:

Transverse section of the bark shows pericyclic sclerenchyma. Isometric cells are arranged in 3 or 4 rows. It also contains starch grains, having 10-micron size, sclerenchyma, no. of pericyclic fibers. Phloem of the tangential bands altering with the parenchyma. Volatile oils are present in the elongated secreting cells. Phloem fibers are 30 micrometer in diameter. In Microscopical section medullary rays are also present.

3.9.6 Identity, Purity and strength⁴⁶:

Foreign matter	:	Not > 2 %
Total ash	:	Not > 3 %
Alcohol soluble extractive	:	Not < 2 %
Water soluble extractive	:	Not < 3 %
Acid insoluble ash	:	Not > 2 %
Volatile oil	:	Not < 1 %

Table 3.7 Ayurvedic literature of tvak

Classical text	Description
Charka Samhita	Use, method of preparation of formulation, indication
Bhavapraksha Niganthu⁴⁸	Kapooradi varga
Niganthu Aadarsh⁴⁹	Kapooradi varga
Shankar Niganthu⁵⁰	Synonyms, properties, uses, dose
API⁴⁶	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses

3.9.7 Chemical Constituents:

Plant contains active constituents such as: volatile oils, starch, mucilage, calcium oxalate crystals⁴⁶.

3.9.8 Ayurvedic properties⁴⁶:

Rasa	:	katu, Tikta, Madhur
Guna	:	Laghu, Ruksha, Tikshana
Virya	:	Ushan
Vipka	:	Katu
Doshakarma	:	Kaphavata shamak

3.9.9 Therapeutic purposes^{46, 51}

- Amenorrhea
- Yakshmanashak (anti- tubercular).
- Mukh-sodhak, beneficial for teeth.
- Grahni, agnimandhya, arsha.
- Dalchini has been used to treat the urinary tract disorders.
- Used in nausea and vomatting.

3.10 Tejpatra



Fig.5 leaves of Tejpatra

Botanical Name : *Cinnamomum tamala, Fr.Nees.*⁵²

Family : Lauraceae

2.10.1 Vernacular names⁵²:

Sanskrit : Patra, Varanga

Hindi : Tejpatra

English : Indian Cinnamon

Assamese : Mahpat, Tejpat

Bengali : Tejpatra, Tejpatra,

Kashmiri : Dalchini pan, tejpatra

Marathi : Tamalpatra

Punjabi : Tajpater

Telugu : Akupatri

3.10.2 Geographical source:

It is a large size tree cultivated in the Shrilanka, Assam, and Sikkim.

3.10.3 Botanical description: It is a small size evergreen tree⁵³.

Leaves: Leaves are coriaceous, green at the upper side and having spicy odour.

Flowers: Plant having small flowers which having the disagreeable smell.

Fruits: Dark purple colored, sizes vary from 1.3 to 2.5 cm. Flowering takes place during the spring season.

3.10.4 Macroscopical characters⁵²:

Its leaves are long and wide 12.5 cm and 5-7.5 cm respectively. At the base of the apex there is a rise of three nerves. The colour of young leaves is pink. Petiole vary from 7.5-13mm long, with entire margin. Apex is acute or acuminate. Leaf is smooth from the both sides (upper and lower lamina). Leaves are having aromatic odour and slightly sweet in taste.

3.10.5 Microscopical characters⁵²:

Transverse Section of petiole and midrib shows cuticle layer, uniseriate, multicellular, trichomes, large number of stone cells and oils cells are present. In cortex, reddish-brown parenchymatus cells are present. In the midrib, upper side of the leaf shows xylem elements, while lower side shows phloem.

Table 3.8 Ayurvedic literature of Tejpatra

Classical text	Description
Charaka Samhita ⁵⁴	Use, method of preparation of formulation, indication
Bhavapraksha Niganthu ⁵⁵	Kapooradi varga
Niganthu Aadarsh ⁵⁶	Kapooradi varga
Shankar Nighantu ⁵⁷	Synonyms, properties, uses, dose
API ⁵²	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses

3.10.6 Ayurvedic Properties⁵²:

Rasa	:	Katu, Tikta, Madhur
Guna	:	Laghu, Ruksha, Tikshana
Virya	:	Ushan
Vipka	:	Katu
Doshakarma	:	Kaphavata shamak

3.10.7 Therapeutic Purposes⁵⁸

- Cinnamic acid having anti tubercular activity.
- Anti-clotting effect on blood
- Beneficial for teeth, mouth disorders.
- Used in grahni, arsha.
- Its oil is used to reduce the hair fall.

3.12 Pippali



Fig.6: Fruits of Pippali

Botanical Name : *Piper longum, Linn.*⁵⁹

Family : Piperaceae

3.12.1 Vernacular names⁵⁹:

Sanskrit : kana, Magadhi, Saundhi, Krsna

Assamese : Pippali

Bengali : Pipul

English : Long Pepper

Hindi : Pipar

Malayalam : Pippali

Kannada : Hippali

Gujrati : Pipali

3.12.2 Geographical source:

It is found all over the India mainly in the topical area. It is native of Phillipine⁶⁰.

3.12.3 Botanical description: It is a perennial climber⁶¹.

Leaves: Leaves having entire margin, glabrous, base is cordate shape. Leaf is 5-9×3-5cm.

Flowers: Male flowers are bigger in size than the female flowers. Flowering takes place in the rainy and autumn season.

Fruits: Piper having yellowish orange color flowers.

3.12.4 Macroscopical characters⁵⁹:

Fruit is 2.5 to 5cm long, cylindrical, greenish-blacknged, fruit is minute sessile, arranged around the axis. Fruit are having the rough surface. On breakage, its surface shows a central axis. Fruit are having pungent taste and aromatic odour.

3.12.5 Microscopical characters⁵⁹:

Powder: Powder microscopy shows fragments of parenchyma; stone cells are oval to elongated shape. Round shape of oil globules, starch grains are also present.

3.12.6 Identity, Purity and Strength⁵⁹:

Foreign matter	:	Not > 2 %
Total ash	:	Not > 7 %
Alcohol soluble extractive	:	Not < 5 %
Acid-insoluble ash	:	Not > 0.5 %
Water –soluble extractive	:	Not > 7 %

Table 3.9 Ayurvedic literature of Pippali

References	Description
Charka samhita⁶²	Formulation uses are mentioned
Bhavapraksha Nighantu⁶³	Haratakyadi varga
Nighantu Aadarsh⁶⁴	Pippalyadi varga
Dhanvantri Nighantu⁶⁵	Shatpushpadi Varga
API⁵⁸	Synonyms, description, characteristics, Identity, purity and strength, constituents, properties, actions, formulation, uses

3.12.7 Ayurvedic properties⁵⁹:

Rasa	:	Katu
Guna	:	Laghu, Snigdha
Veerya	:	Ushana
Vipka	:	Madhura
Doshakarma	:	vatahara-slesmahara

3.12.8 Therapeutic purposes^{51, 59}

- Medhya and vatahar
- Kashar, Swashar, hikkanigrahan.
- Muscular pain.
- Deepen, Pachan and Triptighana.

3.13 Kharjura:



Fig.7: Fruits of Kharjura

Botanical Name : *Phoenix dactylifera, Linn.*⁶⁶

Family : Palmae

3.13.1 Vernacular names⁶⁵:

Sanskrit : Pinda Kharjura

Assamese : Tamar

Bengali : Sohara

English : Dried Dates

Gujrati : Kharek, kharika

Hindi : Chhara, chohar

Kannada : Karinchula, khajura

Malayalam : Prantha Puzam

Marathi : Khajur

Punjabi : Punjabi Kharjura

3.13.2 Geographical source: It is distributed in the Mediterranean countries, Africa and parts of Asia⁶⁷.

3.13.3 Botanical description:

Leaves: Leaves are 3-6 m long.⁶⁷

Flowers: Male and female flowers grow on the different plant. Male flowers are white in colour, female is green colour.

Fruits: Fruit is oval in shape and size vary from one to one and half inches in length. Unripe fruit is greenish yellow coloured and on ripening it turns to red colour.

Seeds: Seeds are 1.7mm long, very hard, rounded at both the ends.

3.13.4 Macroscopical characters⁶⁵:

Fruit is 2 to 3cm, oblong, smooth, having sweet taste, reddish- brown colour with fleshy pulp.

3.13.5 Microscopical characters⁶⁵:

Fruit shows single layered epidermis with striated cuticle, it also contains stomata, parenchymatous cells are thin elongated. Outer zone of the mesocarp shows thin walled parenchyma cells, tannins and oil globules, while inner zone shows shining fibrous mass, loosely and disorganized cells.

3.13.6 Identity, Purity and Strength⁶⁵:

Foreign matter : Not > 1 %

Total ash : Not > 3 %

Acid insoluble ash : Not > 0.5%

Water soluble extractive : Not < 6.5 %

Alcohol soluble extractive : Not < 20 %

Table 3.10 Ayurvedic literature of Kharjura

Classical text	Description
Charak Samhita⁶²	Uses and formulation are mentioned
Bhavapraksha Nighantu⁶⁸	Amaradi verga
Dhanvantri Nighantu⁶⁹	Aamradi verga

API ⁶⁵	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses
-------------------	---

3.13.7 Ayurvedic properties⁶⁵:

Rasa	:	Madhura kasaya
Guna	:	Guru, Snigdha
Veerya	:	Sheet
Vipka	:	Madhura
Karma	:	Hrdya, balya, pittahara, rucikara

3.13.8 Therapeutic purposes^{70,71,72}:

- Beneficial to cure anemia.
- Powder having the effective property over the strengthen of the nervous system.
- Used in the treatment of the fever.
- Helps in weight gain.
- Cure chronic constipation.

3.14 Madhu:



Fig.8: Honey

It is obtained from honey comb of bees (*Apis mellifera*).

3.14.1 Vernacular names⁷³:

Bengali	:	Madhu, Mau
English	:	Honey
Gujrati	:	Madh
Hindi	:	Madhu, Sahad
Kannada	:	Jenetuppa
Malayalam	:	Then
Marathi	:	Madhu
Punjabi	:	Sahad

Table 3.11 Ayurvedic literature of Madhu

Classical text	Description
Charaka Samhita⁷⁴	Use has been mentioned. Used in combination with others drugs for the treatment of the Anemia, Insomnia Types, properties
Shusruta Samhita⁷⁵	Used for the Pittaja abscess. For the treatment of the Kamala.
API⁷²	Synonyms, description, characteristics, identity, purity and strength, constituents, properties, actions, formulation, uses

3.14.2 Identity, Purity and strength⁷¹:

Microscopy: pollen grains are observed in the centrifuge sample of the honey.

Wt. per ml. at 25⁰	:	Not >1.35
Moisture content (LOD)	:	Not < 25 % by wt.
Reducing Sugars	:	Not > 65 % by wt.
Sucrose	:	Not > 5.0 % by Wt.
Fructose glucose ratio	:	Not < 1 % by Wt.
Ash	:	Not > 0.50 % by wt.
Acidity	:	Not > 0.2 % by wt.

3.14.3 Chemical constituents:

Vitamin B, Carbohydrates, Sugars, ascorbic acid. It also contains calcium, mineral, potassium, magnesium, Calcium.

3.14.4 Ayurvedic properties⁷¹:

Rasa	:	Madhura, Kasaya
Guna	:	Laghu (Shusruta), Guru (Charka), Ruksha, Picchila, Yogavahi
Veerya	:	Sheet
Vipaka	:	Katu
Karma	:	Pittaprasamana, Ropana, Agnidipana, Sandhana

3.14.5 Therapeutic purposes^{76,77,78} .:

- Honey helps to promote the fat metabolism. For the weight loss, Cinnamon powder is taken in combination with honey.
- In Susruta Samhita its use has been mentioned to treat the kaphaja disorders
- Raktapitta, medoroga.
- Honey is also used for the antibacterial property
- Cure diabetes

3.15 Mishri



Fig.9 Mishri

3.15.1 Vernacular names:

Hindi : Mishri
English : Rock candy

Table 3.12: Ayurvedic literature of Mishri

Classical text	Description
Charaka Samhita ⁷⁹	Used in combination with others drugs for the treatment of the Anemia, Insomnia Types, properties.
Yogtarangini ⁸⁰	Ingredient of the compound formulation
Rasatantarasara & sidhyogsanhra ⁸¹	As one the ingredient of the eladi gutika

3.15.2 Description⁸²:

It is a form of sugar also named as sugar candy. Mishri having sweet taste. It is used in India and China for the medicinal purpose. It mainly exists in two forms i.e. amorphous and crystalline forms.

3.15.3 Therapeutic purposes^{83,84,85}

- Mishri is used for controlling B.P and diabetes.
- It is used as a mouth freshener in combination of the other drugs like fennel.
- Increases hemoglobin level.
- Effective against sore throat
- It plays important role for improving skin colour.
- Mishri is effective against the cough.

CHAPTER -IV

4.1 Need of the study:

Eladi gutika is a polyherbal formulation with wide array of therapeutic activities including hiccup (hikka), vertigo (bhrama), mada (intoxication), fever (jvara), rheumatism (amavata). However, the dose mentioned of eladi gutika is 2-4 gm. Therefore, it is difficult to prescribe eladi gutika to all age groups. High dose also leads other pharmaceutical drawbacks of vati including dissolution, disintegration and patient incompliance. Therefore, study has been designed to develop and evaluate another dosage form of eladi Gutika i.e. avaleha and granules which were compared with eladi gutika by in-vitro anti-oxidant activities.

CHAPTER -V

5.1 Aim:

Pharmaceutical development and evaluation of Eladi Gutika.

5.2 Objectives:

- To authenticate the crude drugs.
- To develop the different formulations of eladi gutika.
- To evaluate the eladi gutika and its formulations by using analytical parameters.
- To compare therapeutic efficacy by using *in-vitro* antioxidant activities.

CHAPTER-VI

Material and Research Methodology

6.1 List of Equipment used:

1	Stainless steel containers
2	Ladle
3	Stainless steel plate
4	Cotton cloth
5	Sieves
6	Gas stove
7	Spatula
8	Beakers
9	Measuring cylinder
10	Crucible
11	China dish
12	Digital pH meter
13	Electric balance
14	Hot plate
15	Water bath
16	Hot air oven
17	UV spectrophotometer
18	Magnetic stirrer
19	Ultra-centrifuge
20	Desiccator
21	Glass rod
22	Test tubes
23	Tongue
24	Petridish
25	Conical flask
26	Volumetric flask
27	Tripod stand
28	TLC chamber
29	Burette
30	TLC plates
31	Dropper
32	Magnetic bead
33	Verniar caliper

6.2 List of chemicals used:

- 1 Chloroform
- 2 Hydrochloric acid
- 3 Ferric chloride
- 4 Lead acetate
- 5 Sodium hydroxide
- 6 Copper sulphate
- 7 Ninhydrin
- 8 Benedict reagent
- 9 Hager's reagent
- 10 Dragendroff's reagent
- 11 Fehling's reagents
- 12 Bial's reagent
- 13 Molish's reagent
- 14 Barfoed's test
- 15 Iodine solution
- 16 Biuret's reagent
- 17 Million's reagent
- 18 Ethanol
- 19 Methanol
- 20 Petroleum ether
- 21 Toluene
- 22 Ethyl acetate
- 23 Formic acid
- 24 DPPH
- 25 Ascarbose
- 26 Sucrose
- 27 Phenol
- 28 Chloroform
- 29 Glacial acetic acid
- 30 Sodium thiosulphate

6.3 Research Methodology:

- Procurement of raw drugs.
- Authentication of raw drugs.
- Physicochemical studies of raw drugs.
- Preparation of eladi gutika.
- Preparation of granules
- Preparation of avaleha.
- Physico-chemical studies of finished products.
- Qualitative study of finished products.
- Quantitative study of the finished products
- *In-vitro* antioxidant study of the finished products.

CHAPTER-VII

7 Experimental works

7.1 Procurement of the raw material

Yastimadhu, tvak, tejpatra, ela, pippali, munnaka, and honey were procured from the local market of Sundarnagar, Himachal Pradesh. Whereas, kharjura, sita, and ghita were procured from the local market of Phagwara, Punjab.

7.2 Authentication of the drugs

The drugs Ela (*Elettaria cardamomum*), Tejapatra (*Cinnamomum tamala*), Tvak (*Cinnamomum zeylanicum*), Pippali (*Piper longum*), Sita (Sugar), Madhuka (*Glycyrrhiza glabra*), kharjura (*Phoenix dactylifera*), Draksha (*Vitis vinifera*), and Madhu (Honey) were authenticated from the Gurunanak Dev University, Amritsar. Ref.No.1337.

7.3 Analysis of raw materials

7.3.1 Organoleptic evaluation of raw materials

Colour, odour, taste, and texture of each raw material were observed.

7.3.2 Physicochemical evaluation of herbal raw materials

7.3.2.1 Foreign matter⁸⁶

100 g of sample was taken separately and spreaded in a stainless-steel tray. The foreign matter was detected with the unaided eye. Remaining quantity of sample was weighed and percentage of foreign matter was calculated. Same procedure was repeated for all herbal materials.

7.3.2.2 Loss on Drying⁸⁷

5-10 gm of sample was taken separately (without preliminary drying) in the accurately weighed dry petri dish and kept into the dry oven at 105⁰C for 6 hrs. Then, petri dish was removed from the oven and placed into desiccator under vacuum till shelf cooling and weighed the reduced moisture content from the sample. Same procedure was repeated for all herbal materials.

7.3.2.3 Total ash

Incinerated 2.5g of sample into the crucible, at temperature of 450^oc for 5 hours. After shelf cooling, kept in the dedicator under vacuum. The weight of obtained ash was measured and percentage of obtained ash was calculated⁸⁵. Same procedure was repeated for all herbal materials.

7.3.2.4 Acid Insoluble Ash

Ash obtained from the above method was mixed with 25 ml dilute hydrochloric acid and boiled for 5 minutes. Then, mixture was filtered through ash less filter paper. The filtrate was subjected for the washing with hot water to make it chloride free and again ignited to constant weight. Percentage of acid insoluble ash was calculated after weighing obtained ash⁸⁵. Same procedure was repeated for all herbal materials.

7.3.2.5 Water soluble Ash

Total ash obtained was mixed with 25 ml distilled water and boiled for 5 minutes. Then, mixture was filtered through ash less filter paper. The filtrate was ignited to constant weight. Percentage of water soluble ash was calculated after weighing obtained ash⁸⁵. Same procedure was repeated for all herbal materials.

7.3.2.6 Alcohol soluble extractive

5 gm of sample were taken in a closed conical flask with 100ml of alcohol. Conical flask was shaken frequently for 6 hours and kept undisturbed for next 18 hours. Then, it was filtered by using filter paper. 25 ml of filtrate was taken in the china dish and liquid content was evaporated on water bath. Percentage was calculated after weighing the residue⁸⁶. Same procedure was repeated for all herbal materials.

7.3.2.7 Water soluble extractive

Process of 7.3.2.6 was repeated for all samples by using water instead of alcohol⁸⁶.

7.3.3 Qualitative Analysis of herbal raw material

7.3.3.1 Test for Alkaloids⁸⁸

- **Dragendroff's test:** Extract was dissolved in dilute HCl and filtered. It was treated with Dragendroff's reagent (solution of Potassium Bismuth Iodide). No colour or precipitates or turbidity was observed.
- **Mayer's reagent:** Alkaloids give cream color precipitates with Mayer's reagent. (Potassium mercuric iodide).

7.3.3.2 Test for saponin glycosides⁸⁹

Foam test: Drug extract was shaken vigorously with water. Persistent foam was observed.

7.3.3.3 Test of reducing sugar⁹⁰

- **Benedict's test:** Test solution and Benedict's reagent was mixed in equal quantity and kept in boiling water for 5 minutes. Formation of red colour confirms the presence of reducing sugar.
- **Fehling's test:** Mixed 1 ml of Fehling's A and Fehling's B solution, boil for 1 minute. After boiling, equal volume of test solution is added in test tube. Again, heated on boiling water bath for 5-10 min. First get yellow, then brick red precipitates was observed.

7.3.3.4 Tests for monosaccharide's

- **Barfoed's test:** Mixed equal volume of Barfoed's reagent and test solution. Heat for 1-2 min boiling water bath and cool. Red precipitates were observed.⁹¹

7.3.3.5 Tests for amino acids

- **Ninhydrin test:** Heated 3 ml test solution and add 3 drops of 5% ninhydrin solution. Boiled on water bath for 10 min. purple or bluish color observed.

7.3.3.6 Test for Steroids

- **Salkowski reaction:** 2 ml extract was taken and added 2 ml chloroform and 2 ml con. Sulphuric acid shaken well. Chloroform layer appeared red and acid layer showed greenish yellow fluorescence for the presence of steroids.⁹²

7.4 Analysis of honey

7.4.1 Determination of pH

The pH values of an aqueous liquid may be defined as the common logarithm of the reciprocal of hydrogen ion concentration expressed in g per liter. pH of the 1% aqueous solution of honey was recorded by pH meter.

7.4.2 Total solid content⁹³

50 ml of the filtered solution of the honey was taken in an evaporating china dish and was dried to a constant weight and it was evaporate to dryness on the water and after that dried extract was subjected to the hot air oven for 105°C for 3 hours .After cooling the residue in a desiccators for 30 minutes, was weighed immediately and percentage of the total solid was calculated.

7.4.3 Ash value⁹⁴

5 gm of sample were weighed in crucible and charred on a hot plate and then placed in a muffle furnace at 450°C for four hours. Residue left in crucible was weighed and percentage of ash was calculated.

7.4.4 Reducing sugar⁹⁵:

7.4.4.1 Preparation of sample:

10 gm of honey was dissolved in water and volume was made to 250ml in a conical flask. Added 2ml lead acetate solution, shaken well, kept it for 10 minutes. Potassium oxalate was added to remove the excess of lead and filtered through Whatman's filter paper.

7.4.4.2 Procedure: 5ml of Fehling's A and B were taken in a conical flask. Sample was taken in the burette and titrated against boiling Fehling's solutions by using methylene blue as an indicator. At end point, brick red precipitates were observed.

7.4.5 Density measurement:

The pycnometer was washed with water and then rinsed with acetone. The weight of empty pycnometer is taken. Then, weight of pycnometer along with the honey was taken. Density of honey was calculated using formula mass/volume.

7.5 Analysis of Cow's ghee

7.5.1 Organoleptic characters of cow's ghee

Color and odour of the cow's ghee was observed for the organoleptic characters.

7.5.2 Physicochemical evaluation of Cow ghee

7.5.2.1 Specific gravity⁹⁶:

A pycnometer of 25 ml, capacity is clean, dried and weighed. It is filled up to the mark with water at the required temperature and weight. The pycnometer is next filled up to the mark with the sample, at the same temperature and weighed, the specific gravity is determined by dividing the weight of the sample in grams by the weight of the water, expressed in grams.

7.5.2.2 Refractive index⁹⁷

The refractive index (n) of a substance with reference to air, the ratio of sine of the angle of incidence to the sine of the angle of refraction of a beam of light, passing from air into the medium. It varies with the wavelength of the light used in its measurement. Abbe's refractometer was used for the determination of the Refractive index of ghee. Few drops

of the sample were placed on the lower prism of the refractometer and prism was tightly closed. Then, refractive index was recorded.

7.5.2.3 Determination of saponification value⁹⁸

35 to 40 g of potassium hydroxide was dissolved in 20 ml water, added sufficient alcohol to make 1,000 ml. Kept it to stand overnight, and poured off the clear liquor. 2 g of the sample weighed in a tared 250 ml flask, added 25 ml of the alcoholic solution of potassium hydroxide, attached a reflux condenser and boiled on a water-bath for one hour, cooled flask by rotating the contents of the flask and 1 ml of solution of phenolphthalein was added and titrated the excess of alkali with 0.5 N hydrochloric acid. Number of ml required was recorded and experiment with the same quantities was repeated without sample. Then, saponification value was calculated by using the formula.

7.5.2.4 Determination of acid value⁹¹

Weighed accurately about 10 g of the substance into a 250 ml flask and added 50 ml of a mixture of equal volumes of alcohol and solvent ether, which was neutralized after the addition of 1 ml of solution of phenolphthalein. Heated gently on a water-bath until the substance has completely melted and titrated with 0.1 N potassium hydroxide, shaken constantly until a pink colour. Noted the number of ml required and calculated the acid value from the formula.

7.5.2.5 Determination of peroxide value⁹¹

5 g of sample was accurately weighed into a 250-ml glass-stoppered conical flask, 30 ml of a mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform were added, swirled to dissolve and added 0.5ml volumes of saturated potassium iodide solution. Allowed to stand for exactly 1 minute, with occasional shaking, added 30 ml of water. Titrated with 0.01M sodium thiosulphate. At end point, yellow colour disappeared. Added 0.5 ml of starch solution and continued the titration, shaken vigorously until the blue colour just disappeared. Repeated the operation without sample. Peroxide value was calculated by using the formula.

7.6 Preparation of formulations:

7.6.1 Preparation of eladi gutika

7.6.2 Preparation of avaleha

7.6.3 Preparation of granules

7.6.1 Preparation of eladi gutika:

Five batches of eladi gutika were prepared to standardize the process. (Ayurvedic Formulary of India, Part-1, 32-35) Ingredients, their ratios and process were same for all the batches.

Table: 7.1 Ingredients of eladi gutika:

Sr.no	Common name	Scientific name	Part Used	Ratio
1	Yastimadhu	<i>Glycyrrhiza glabra</i>	Roots	8
2	Ela	<i>Elettaria cardamomum</i>	Seeds	1
3	Tvak	<i>Cinnamomum zeylanicum</i>	Bark	1
4	Munnaka	<i>Vitis venifera</i>	Fruits	8
5	Tejpatra	<i>Cinnamomum tamala</i>	Leaves	1
6	Pippali	<i>Piper longum</i>	Fruits	4
7	Kharjura	<i>Phoenix dactlifera</i>	Fruits	8
8	Madhu	<i>Apis melifera</i>	-	8
9	Mishri	Rock candy	-	8

7.6.1.1 Before process:

7.6.1.1.1 Preparation of powders:

Yastimadhu, ela, tvak, tejpatra and pippali were grounded separately to the fine powders (sieve no. 85) and then powders were taken in the ratio mentioned in the **Table 7.1**. The same method was used for the preparation of powders of other batches.

7.6.1.1.2 Preparation of paste:

The paste of munnaka and kharjura was prepared separately and then pastes were taken in the ratio mentioned in the **Table 7.1**. The same method was used for the preparation of pastes of others batches.

7.6.1.2 During process:

7.6.1.2.1 Mixing of powdered drugs

The powders were taken in the above-mentioned ratio and homogeneously mixed by serial dilution and kept a side for further process.

7.6.1.2.2 Mixing of powdered drugs with pastes:

The prepared pastes were homogeneously mixed together as per the ratio. Then, mixture of powders was added and homogeneously mixed.

7.6.1.2.3 Trituration with honey:

Mixture prepared in **7.9.1.2.2** was triturated with the honey till the consistency of bolus became hard.

7.6.1.2.4 Preparation of gutika:

Gutikas were prepared as per their dose.

7.6.1.3 After process:

Prepared gutikas were kept in to room temperature After drying, stored in air tight container for the further use.

7.6.2 Preparation of avaleha:

Five batches of avaleha were prepared to standardize the process of avaleha. Ingredients and their ratios were same as mentioned in the **Table 7.1** except cow's ghee. Cow's ghee was used for the frying of pisti. The quantity of cow's ghee was 1/4th of the pisti. The same process was used for all the remaining batches of avaleha.

7.6.2.1 Before Process:

7.6.2.1.1 Preparation of powders:

Ela, tvak, tejpatra and pippali were grounded separately for the preparation of fine powders (sieve no. 85). Whereas, yasthimadhu was converted in to the coarse powder (sieve no. 8).

7.6.2.1.2 Preparation of paste:

The paste of munnaka and kharjura was prepared separately and then pastes were taken in the ratio mentioned in the **Table 7.1**.

7.6.2.1.3 Preparation of kwatha

Coarse powder of yasthimadhu was soaked in 16th part of water in stainless steel container for 15 hours. After soaking, it was subjected to the mild heat (80-90 °C) to reduce it upto 1/4th of its initial quantity. During the heating process, continuous stirring was done to facilitate the evaporation and avoid any deterioration due to burning of materials. After 1/4th reduction of water, the kwatha was filtered through double folded cotton cloth and collected in separate vessel.

7.6.2.2 During Process

7.6.2.2.1 Preparation of pisti

Pastes of munnaka and kharjura were fried in the cow's ghee.

7.6.2.2.2 Preparation of sugar syrup

The kwatha prepared in 7.9.2.1.3 was mixed with appropriate ratio of mishri for the preparation of sugar syrup and kept at mild temperature. Continuous stirring was done throughout the process.

7.6.2.2.2 Mixing of sugar syrup and pisti

The sugar syrup and pisti were homogeneously mixed and kept for the shelf cooling.

7.6.2.2.3 Addition of prakesha dravya

The fine powder of each drug was mixed homogeneously in its ratio one by one. Finally, honey was mixed.

7.6.2.3 After process

Prepared avaleha was kept in air tight container for further uses.

7.6.3 Preparation of granules

Five batches of granules were prepared to standardize the process of granules. Ingredients and their ratios were same as mentioned in the **Table 7.1**. The process of **7.9.1** was used for preparation of granules of each batch. However, triturated bolus was transferred through the sieve (sieve no. 10) for the preparation of granules instead converting it to the gutika.

7.6.3.1 After process

Granules were shade dried and packed in air tight container for the further use.

7.7 Analysis of finished products

7.10.1 Analysis of eladi gutika

7.10.2 Analysis of avaleha

7.10.3 Analysis of granules

7.7.1 Analysis of eladi gutika

7.7.1.1 Determination of pH

The process was same as mentioned in section **7.4.1** for the determination of pH of eladi gutika.

7.7.1.2 Loss on drying

The process was same as mentioned in section **7.3.2.2** for the determination of loss on drying of eladi gutika.

7.7.1.3 Total Ash

The process was same as mentioned in section **7.3.2.3** for the determination of Total Ash of eladi gutika.

7.7.1.4 Acid insoluble ash

The process was same as mentioned in section **7.3.2.4** for the determination of acid insoluble ash of eladi gutika.

7.7.1.5 Water soluble Ash

The process was same as mentioned in section **7.3.2.5** for the determination of water soluble ash of eladi gutika.

7.7.1.6 Water soluble extractive value

The process was same as mentioned in section **7.3.2.6** for the determination of water soluble extractive value of eladi gutika.

7.7.1.7 Alcohol soluble extractive value

The process was same as mentioned in section **7.3.2.7** for the determination of alcohol soluble extractive value of eladi gutika.

7.7.1.8 Weight variation

20 gutikas were taken from each batch and weighed individually. The average weight for 20 gutikas was recorded. The weight of all gutikas in different batches was under the prescribed limit i.e. No gutika should deviate by more than double to the 5% from the

average and not more than two tablets should deviate from the average by the same percentage⁹⁹

7.7.2 Analysis of avaleha

7.7.2.1 Total Ash

The process was same as mentioned in section 7.3.2.3 for the determination of Total Ash of avaleha.

7.7.2.2 Loss on drying

The process was same as mentioned in section 7.3.2.2 for the determination of loss on drying avaleha.

7.7.2.3 Acid insoluble ash

The process was same as mentioned in section 7.3.2.4 for the determination of acid insoluble ash of avaleha.

7.7.2.4 Determination of pH

The process was same as mentioned in section 7.4.1 for the determination of pH of avaleha.

7.7.2.5 Total solid

The process was same as mentioned in section 7.4.2 for the determination of total solid of avaleha.

7.7.2.6 Fat content

Accurately weighed avaleha was taken and extracted with petroleum ether at temperature 40-60°C by using the soxhlet apparatus. Extract was dried in a desiccator and solvent was removed under vacuum at 40°C. Then, percentage was calculated after weighing the residue.¹⁰⁰

7.7.3 Analysis of granules

7.7.3.1 Loss on drying

The process was same as mentioned in section 7.3.2.2 for the determination of loss on drying of eladi gutika.

7.7.3.2 Total Ash

The process was same as mentioned in section 7.3.2.3 for the determination of Total Ash of eladi gutika.

7.7.3.3 Acid insoluble ash

The process was same as mentioned in section 7.3.2.4 for the determination of acid insoluble ash of eladi gutika.

7.7.3.4 Water soluble Ash

The process was same as mentioned in section 7.3.2.5 for the determination of water soluble ash of eladi gutika.

7.7.3.5 Water soluble extractive value

The process was same as mentioned in section 7.3.2.6 for the determination of water soluble extractive value of eladi gutika.

7.7.3.6 Alcohol soluble extractive value

The process was same as mentioned in section 7.3.2.7 for the determination of alcohol soluble extractive value of eladi gutika.

7.7.3.7 Angle of repose

100gm of granules was weighed and poured through the funnel that was prepared. The funnel was lifted upward and an intermediates slope was prepared by granules on top of the rubber stopper and diameter of peak and height were measured using ruler and calculated the angle of repose¹⁰¹

7.7.3.8 Bulk density

Passed a quantity of granules through a sieve with apertures greater than or equal to 1.0 mm, if necessary, to break up agglomerates that may have formed during storage; this must be done gently to avoid changing the nature of the material. Into a dry graduated cylinder of 250 ml gently introduce, without compacting, approximately 100 g of granules weighed. Carefully level the powder without compacting, if necessary, and read the unsettled apparent volume to the nearest graduated unit. Calculate the bulk density in (g/ml) using the formula m/V_0

7.8 TLC

TLC (Thin Layer Chromatography) is an important or easy technique for the qualitative and quantitative analysis of the compound or herbal drugs. It consists two phases one is stationary phase and another is mobile phase. In the analysis of different formulations of eladi gutika, TLC was developed using suitable solvent system

7.8.1 Preparation of sample

5 gm of each formulation was extracted with 25ml of methanol under reflux on a water bath for 30 minutes. Filtered extract was concentrated to 10 ml and then TLC was carried out 10 ml was used to carry out the TLC.

7.8.2 Chromatographic conditions

Solvent System : Toluene: Ethyl Acetate: Formic Acid (9.2:9.2:1.5)
Extract : Methanol extract
Chamber Saturation : 30 minutes
Visualization : long U.V. (365nm)

7.9 HPTLC

HPTLC is the advanced form of TLC used for the qualitative and quantitative analysis by enhancing the separation and resolution of the compounds. Fine particle size of stationary phase ensures the better efficiency of the separation and resolution in HPTLC. The preparation of samples of the formulations and chromatographic conditions were same as in 7.8.2.

7.10 DPPH Assays

700µl of extract of each formulation was added in to the same volume of 100µM DPPH methanolic solution. Then, it was shaken vigorously and kept in the dark place for 20 min at room temperature. Lastly, absorbance was recorded at 515nm. Percentage of inhibition was calculated by using following formula¹⁰²

$$\text{Percentage inhibition (I\%)} = \frac{\text{Abs}_{\text{control}} - \text{Abs}_{\text{Sample}}}{\text{Abs}_{\text{control}}} \times 100$$

CHAPTER –VIII

8 RESULTS AND DISCUSSION

8.1 Analysis of raw drugs:

8.1.1 Organoleptic Study of raw materials:

Table:8.1 Observation of organoleptic study of raw drug materials:

Sr.no	Organoleptic characters	Yastimadhu	Tvak	Tejpatra	Munnaka	Kharjura
1	Colour	Yellowish white	Brown	Light green	Blackish brown	Brown
2	Odour	Sweet	Aromatic	Aromatic	Pleasant	Characteristics
3	Taste	Sweet	Sweet, Bitter, pungent	Sweet, Pungent	sweet	Sweet
4	Texture	Rough	Rough	Rough	Rough	Sticky

Table8.2: Observation of organoleptic study of raw drug materials

Sr.no	Organoleptic characters	Ela	Pippali	Honey	Mishri	Ghee
1	Colour	Light green	Black	Brownish yellow	White	Yellow
2	Odour	Aromatic	Aromatic	Sweet	characteristics	Characteristics
3	Taste	Sweet	Bitter, pungent	Sweet	Sweet	Taste less
4	Texture	Rough	rough	Sticky	Smooth	Sticky

The organoleptic characteristics of raw material like: colour, odour, taste and texture is mentioned in **Table: 8.1 &Table: 8.2**

8.1.2 Physicochemical parameters of raw materials:

8.1.2.1 Physicochemical analysis of yastimadhu:

Table 8.3: Results of physicochemical parameters of yastimadhu

Sr.no	Physicochemical parameters	observations
1	Loss on drying (%)	5.2
2	Foreign matter (%)	Nil
3	Water soluble extractive value (%)	38.66
4	Alcohol soluble extractive value (%)	27.46
5	Total Ash (%)	6.4
6	Acid Insoluble Ash (%)	1.3

All the physicochemical parameters of yastimadhu were under the limits as mentioned in standard monograph (API). Reference for loss on drying and foreign matter are not available in the monograph (API). However, Loss on drying was also performed during the study and results of the analysis are mentioned in **Table 8.3**

8.1.2.2 Physicochemical analysis of tvak:

Table 8.4: Results of physicochemical parameters of tvak

Sr. no	Physicochemical parameters	Observations
1	Loss on drying (%)	5.9
2	Foreign matter (%)	0.84
3	Water soluble extractive value (%)	10.8
4	Alcohol soluble extractive value (%)	4.8
5	Total Ash (%)	2.7
6	Acid Insoluble Ash (%)	1.6

All the physicochemical parameters of tvak were under the limit as mentioned in standard monograph (API). Reference for loss on drying is not available in the monograph (API). However, loss on drying was performed during the study and results of the analysis are mentioned in **Table 8.4**

8.1.2.3 Physicochemical analysis of tejpatra

Table 8.5 Results of physicochemical parameters of tejpatra

Sr.no	Physicochemical parameters	Observations
1	Loss on drying (%)	6.8
2	Foreign matter (%)	0.16
3	Water soluble extractive value (%)	20
4	Alcohol soluble extractive value (%)	13.06
5	Total Ash (%)	2.8
6	Acid Insoluble Ash (%)	0.4

All the physicochemical parameter of Tejptra were under the limit as mentioned in standard monograph (API). Reference for loss on drying is not available in a Monograph (API), However, Loss on drying was performed during the study and results of the analysis are mentioned in **Table 8.5**

8.1.2.4 Physicochemical analysis of munnaka:

Table 8.6 Results of physicochemical parameters of munnaka

Sr.no	Physicochemical Parameter	Observations
1	Foreign matter (%)	Nil
2	Water soluble extractive value (%)	71
3	Alcohol soluble extractive value (%)	38.73
4	Total Ash (%)	2.4
5	Acid Insoluble Ash (%)	0.1

All the physicochemical parameter of Munnaka was under the limits as mentioned in standard monograph (API). However, all the parameters were performed during the study and result analysis are mentioned in **Table 8.6**

8.1.2.5 Physicochemical analysis of kharjura:

Table 8.7 Results of physicochemical parameters of kharjura

Sr.no	Physicochemical Parameter	Observations
1	Loss on drying (%)	9
2	Foreign matter (%)	Nil
3	Water soluble extractive value (%)	74.3
4	Alcohol soluble extractive value (%)	33.1
5	Total Ash (%)	2.4
6	Acid Insoluble Ash (%)	0.4

All the physicochemical parameter of kharjura were under the limits as mentioned in standard monograph (API). Reference for loss on drying is not available in the monograph (API). However, all the parameters were performed during the study and results are mentioned in **Table 8.7**

8.1.2.6 Physicochemical analysis of ela:

Table 8.8: Results of physicochemical parameters of ela

Sr.no	Physicochemical Parameter	observations
1	Loss on drying (%)	8.2
2	Foreign matter (%)	Nil
3	Water soluble extractive value (%)	13.7
4	Alcohol soluble extractive value (%)	5.8
5	Total Ash (%)	4.7
6	Acid Insoluble Ash (%)	2.6

All the physicochemical parameter of ela were under the limits as mentioned in standard monograph (API). Reference for loss on drying is not available in the Monograph (API). However, all the parameters were performed during the study and result analysis are mentioned in **Table 8.8**

8.1.2.7 Physicochemical analysis of pippali:

Table 8.9: Results of physicochemical parameters of pippali

Sr.no	Physicochemical Parameter	Observations
1	Loss on drying (%)	9
2	Foreign matter (%)	0.8
3	Water soluble extractive value (%)	16.8
4	Alcohol soluble extractive value (%)	9.2
5	Total Ash (%)	4.6
6	Acid Insoluble Ash (%)	0.5

All the physicochemical parameter of pippali were under the limits as mentioned in standard monograph (API). Reference for loss on drying is not available in the monograph (API). However, all the parameters were performed during the study and results are mentioned in **Table 8.9**

8.1.2.8 Physicochemical analysis of honey:

Table 8.10: Results of physicochemical parameters of honey

Sr.no	Physicochemical parameters	observations
1	Density (g/ml)	1.27
2	Loss on drying (%)	14.7
3	Ash value (%)	0.3
4	pH	7.55
5	Total solid content (%)	85.3
6	Reducing Sugar (%)	42

All the physicochemical parameter of honey was under the limits as mentioned in standard monograph (API) and results are mentioned in **Table 8.10**

8.1.2.9 Physicochemical analysis of cow's ghee:

Table 8.11: Results of physicochemical parameters of ghee

Sr.no	Parameter	Observations
1	Rancidity test	-ve
2	Refractive Index	1.45
3	Specific gravity	0.87
4	Saponification value	221.3
5	Acid value	0.317
6	Peroxide value	0.932

Standards of the physicochemical analysis of ghee were found in Ayurvedic Pharmacopoeia of India. However, physicochemical parameters were performed during the study and results of the analysis are mentioned in **Table 8.11**

8.1.3 Qualitative analysis of raw materials:

Table 8.12: Results of qualitative analysis of raw materials

Plant	Alkaloid	Tannins	Phenols	Flavonoids	Glycosides	Carbohydrates
Yastimadhu	-	-	-	+	+	-
Ela	-	+	+	-	-	+
Tvak	-	+	-	+	-	+
Munnaka	+	-	-	+	+	-
Tejpatra	-	+	-	+	-	+
Pippali	+	+	+	-	+	+
Kharjura	+	-	-	-	-	-
Mishri	-	-	-	-	-	+
Madhu	-	-	-	-	-	+

Note- (+) sign represents the presence & (-) sign represents Absence of the phytochemical constituents.

Results of the qualitative analysis of different raw materials are mentioned in the **Table 8.12**

8.2 Preparation of Eladi gutika

8.2.1 Ingredients of Eladi Gutika:

Table: 8.13 Quantity of ingredients to prepare the Eladi gutika

Sr. no	Ingredients	Part used	Different batches of eladi gutika (g)				
			I	II	III	IV	V
1	Yastimadhu	Roots	48	48	48	48	48
2	Ela	Seeds	6	6	6	6	6
3	Tvak	Bark	6	6	6	6	6
4	Tejpatra	Leaves	6	6	6	6	6
5	Pippali	Fruits	24	24	24	24	24
6	Mishri	-	48	48	48	48	48
7	Kharjura	Fruits	48	48	48	48	48
8	Madhu	-	48	48	48	48	48
9	Munnaka	Fruits	48	48	48	48	48

Five batches of eladi gutika were prepared by taking the ingredients as mentioned in the **Table 8.13**

8.2.2 Preparation of powders:

Table: 8.14 Observation of powdering of raw materials

1. Yashtimadhu

Parameters	Batch					Average
	I	II	III	IV	V	
Initial weight (g)	80	80	80	80	80	80
Final qty (g)	52.36	50.21	50.9	51.87	53.21	51.71
Loss (g)	27.64	29.79	29.1	26.79	28.13	28.29
Yield (%)	65.45	62.76	63.62	64.83	66.51	64.63

2. Tvak

Initial weight (g)	15	15	15	15	15	15
Final qty (g)	9	7.8	9.1	8.5	7.8	8.44
Loss (g)	6	7.2	5.9	6.5	6.8	6.48

Yield (%)	60	52	60.6	56.66	54.66	56.78
------------------	----	----	------	-------	-------	-------

3. Ela

Initial weight (g)	30	30	30	30	30	30
Final qty (g)	11.6	12	14.1	13	12.9	121.72
Loss (g)	18.4	18	15.9	17	17.1	17.28
Yield (%)	38.66	40	47	43.33	43	42.39

4. Tejpatra

Initial weight(g)	20	20	20	20	20	20
Final Qty(g)	12.3	12	11.7	11.5	12.8	12.06
Loss(g)	7.7	8	8.3	8.5	7.2	7.94
Yield (%)	61.5	60	58.5	57.5	59.5	59.4

5. Mishri

Initial weight(g)	55	55	55	55	55	55
Final Qty(g)	51	51.6	51.3	51	51.1	51.2
Loss(g)	4	3.4	3.1	4	3.9	3.68
Yield (%)	92.72	93.81	93.27	92.72	92.90	93.08

6. Pippali

Initial weight(g)	45	45	45	45	45	45
Final Qty(g)	32	33.7	33	31.86	34	32.91
Loss(g)	13	11.3	12	13.14	11	12.08
Yield (%)	71.11	74.8	73.3	70.8	75.5	73.10

Each ingredient was taken in the quantity mentioned in the Table 8.14 for all the batches to convert it in to the fine powder. Average loss and yield for each ingredient is also discussed in the table.

8.2.3 Preparation of paste

Table: 8.15 Quantity of ingredients for preparation of paste.

Batch	Wt. of kharjura				Wt. of Munnaka			
	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)
I	60	53.1	6.9	88.5	60	56	4	93.3
II	60	53.7	6.3	89.5	60	57.2	2.8	95.3
III	60	52.9	7.1	88.2	60	57.1	2.9	95.2
IV	60	53.5	6.5	89.1	60	56.8	3.2	94.7
V	60	53.2	6.8	88.6	60	56.8	3.2	94.7
Average	60	53.4	6.7	88.8	60	56.78	3.2	94.6

Pastes of kharjura and munnaka were prepared for the preparation of eladi gutika. Detail observations are mentioned in the Table: 8.15.

8.2.4 Trituration with honey

Table: 8.16 Observations during the trituration with honey:

Parameters	Batches					Average
	I	II	III	IV	V	
Total quantity of mixture (g)	138	138	138	138	138	138
Total quantity of pastes (g)	96	96	96	96	96	96
Quantity of honey (g)	48	48	48	48	48	48
Final quantity of bolus (g)	224.7	223.4	226.7	221.3	224.9	224.2
Yield (%)	79.7	79.2	80.3	78.5	79.5	79.44

For the preparation of vati, mixture of powders and pastes were taken for the homogeneous mixing as per the quantity mentioned in the **Table: 8.16**. Further, that blend was triturated with the honey for approximately 15 min. The average yield of bolus was 224.2 g which is finally converted in to the gutika of 10 g dose.

8.3 Preparation of Avaleha

Table: 8.17 Quantity of the ingredients for the preparation of Avaleha

Sr No	Ingredients	Part Used	Batches (g)				
			I	II	III	IV	V
1	Yastimadhu	Roots	24	24	24	24	24
2	Ela	Seeds	3	3	3	3	3
3	Tvak	Bark	3	3	3	3	3
4	Tejpatra	Leaves	3	3	3	3	3
5	Pippali	Fruits	12	12	12	12	12
6	Mishri	-	96	96	96	96	96
7	Kharjura	Fruits	24	24	24	24	24
8	Madhu	-	24	24	24	24	24
9	Munnaka	Fruits	24	24	24	24	24
10	Cow's ghee		12	12	12	12	12

8.3.1 Preparation of powders

Table: 8.18 Observations during preparation of powders

1) Yashtimadhu

Parameters	Batches					Average
	I	II	III	IV	V	
Initial weight (g)	52	52	52	52	52	52
Final Qty(g)	40.04	41.1	41.5	40.7	41.9	41.05
Loss(g)	11.9	10.9	10.5	11.3	10.1	10.95

Yield (%)	77	79.03	79.8	78.3	80.6	78.9
------------------	----	-------	------	------	------	------

2)Tvak

Initial weight(g)	15	15	15	15	15	15
Final Qty(g)	8.09	8.3	8.5	7.9	7.7	8.09
Loss(g)	6.9	6.7	6.5	7.1	7.3	6.9
Yield (%)	53.9	55.33	56.6	52.7	51.3	53.97

3)Ela

Initial weight(g)	17	17	17	17	17	17
Final Qty(g)	6.9	6.82	7.23	7.1	6.93	6.99
Loss(g)	10.1	10.2	9.77	9.9	10.07	10.01
Yield (%)	40.6	40.1	42.5	41.8	40.8	41.2

4)Tejpatra

Initial weight(g)	15	15	15	15	15	15
Final Qty(g)	8.1	8.23	8.4	8.71	8.58	8.4
Loss(g)	6.9	6.77	6.6	6.29	6.42	6.59
Yield (%)	54	54.86	56	58.06	57.2	56.02

5)Mishri

Initial weight(g)	100	100	100	100	100	100
Final Qty(g)	95.88	96.68	96.83	96.77	96.72	96.6
Loss(g)	4.12	3.32	3.17	3.23	3.28	3.4
Yield (%)	95.88	96.68	96.83	96.77	96.72	96.6

6)Pippali

Initial weight(g)	30	30	30	30	30	30
Final Qty(g)	21.7	21.75	21.56	21.49	21.66	21.63

Loss(g)	8.3	8.25	8.4	8.5	8.3	8.35
Yield (%)	72.3	72.5	71.9	71.6	72.2	72.1

Each ingredient was taken in the quantity mentioned in the Table 8.17 for all the batches to convert it in to the fine powder except yashtimadhu. Coarse powder of yashtimadhu was prepared. Average loss and yield for each ingredient is also discussed in the table. **Table 8.18**

8.3.2 Preparation of paste

Table: 8.19 Quantity of ingredients for preparation of paste.

Batch	Wt. of kharjura				Wt. of Munnaka			
	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)
I	40	34.1	5.9	85.3	40	37.3	2.7	93.25
II	40	33.9	6.1	84.7	40	37.6	2.4	94
III	40	33.7	6.3	84.2	40	36.7	3.3	91.8
IV	40	33.3	6.7	83.3	40	37.9	2.1	94.8
V	40	34.3	5.7	85.7	40	38.1	1.9	95.3
Average	40	33.9	6.1	84.64	40	37.5	2.48	93.9

Pastes of kharjura and munnaka were prepared for the preparation of avaleha. Detail observations are mentioned in the Table: 8.19.

8.3.3 Preparation of kwatha

Table 8.20: Observation parameter for kwatha

Parameter	Batches					Average
	I	II	III	IV	V	
Initial weight of	24	24	24	24	24	24

Kwatha churna (g)						
Total quantity of water (ml)	384	384	384	384	384	384
Total time for soaking(h)	15	15	15	15	15	15
Temp. during preparation of kwatha	80°C-90°C	80°C-90°C	80°C-90°C	80°C-90°C	80°C-90°C	80°C-90°C
Total Time taken for kwatha (h)	1:30	1:30	1:30	1:30	1:30	1:30
Total quantity of Kwatha obtained (ml)	96	95.5	96	96.3	95.8	95.92

Coarse powder of the drug was prepared and sieved through 8#. The material was soaked for 15 hrs for each batch and subjected to heat. Continuous stirring was done during the preparation of kwatha to get uniform concentration throughout the solvent and also to protect the drug from burning. The temperature was maintained below 90°C throughout the process. The first batch took 1:30 hrs to get reduced up to 1/4th. The average yield of kwatha for all batches was approximately 95.92. Prepared kwatha was subjected for the physicochemical analysis. Observation of all batches of kwatha are mentioned in **Table 8.20**

8.3.4 Ingredients of sugar syrup:

Table: 8.21 Ingredients of sugar syrup

Sr.no	Ingredients	Latin name	Qty
1	Yastimadhu kwatha	<i>Glycyrrhiza glabra</i>	65 ml
2	Mishri	-	96 gm

Sugar solution was prepared by taking 65 ml of decoction and 96 gm of mishri for each batch. The detail is mentioned in the in the **Table: 8.20**. Prepared sugar syrup was mixed with the pisti and prakshepa were added one by one as per the quantity mentioned in the Table: 8.21

8.3.5 Yield of avaleha:

Table: 8.22 final yield of avaleha:

Parameter	Batch					Average
	I	II	III	IV	V	
Total quantity of ingredients (g)	228	228	228	228	228	228
Quantity of avaleha (g)	179.87	178.77	179.67	179.79	178.32	179.28
Yield (%)	78.9	78.4	78.8	78.9	75.57	78.114

The average yield of the avleha was 78.114%. The detail of the different batches are mentioned in the **Table: 8.22**.

8.4 Preparation of Granules:

8.4.1 Ingredients of granules:

Table: 8.23 Ratio of ingredients of Granules

Ingredients	Ratio	Quantity of ingredients (g)				
		I	II	III	IV	V
Ela	1	3	3	3	3	3
Madhuyasti	8	24	24	24	24	24

Mishri	8	24	24	24	24	24
Munnaka	8	24	24	24	24	24
Pippali	4	12	12	12	12	12
Kharjura	8	24	24	24	24	24
Dalchini	1	3	3	3	3	3
Honey	8	24	24	24	24	24
Tejpatra	1	3	3	3	3	3

Five batches of granules were prepared. The quantities of ingredients were same for the all the batches. Detail of the different batches are mentioned in the **Table: 8.23**

8.4.2 Preparation of powdered drugs:

Table: 8.24 Observation during preparation of powders:

1. Yashtimadhu

Parameters	Batches					Average
	I	II	III	IV	V	
Initial weight(g)	52	52	52	52	52	52
Final Qty(g)	33.49	35.12	33.15	34.66	33.34	33.9
Loss(g)	18.51	16.88	18.85	17.34	18.66	18.04
Yield (%)	64.4	67.5	63.7	66.7	64.1	65.28

2. Tvaka

Initial weight(g)	15	15	15	15	15	15
Final Qty(g)	7.6	7.7	7.9	7.5	8.1	7.33
Loss(g)	7.4	7.3	7.1	7.5	6.9	7.24
Yield (%)	50.7	51.3	52.7	50	54	51.74

3. Ela

Initial weight(g)	17	17	17	17	17	17
Final Qty(g)	6.92	6.82	6.71	6.77	6.93	6.83
Loss(g)	10.08	10.18	10.29	10.23	10.07	10.17
Yield (%)	40.7	40.1	39.5	39.8	40.8	40

4. Tejpatra

Initial weight(g)	15	15	15	15	15	15
Final Qty(g)	8.43	8.49	8.75	8.71	8.69	8.6
Loss(g)	6.57	6.51	6.25	6.29	6.31	6.38
Yield (%)	56.2	56	58.33	58.06	57.93	57.30

5. Mishri

Initial weight(g)	30	30	30	30	30	30
Final Qty(g)	28.88	28.68	28.83	28.77	28.72	28.78
Loss(g)	1.12	1.32	1.17	1.23	1.28	1.22
Yield (%)	96.26	95.6	96.1	95.9	95.73	95.91

6. Pippali

Initial weight(g)	30	30	30	30	30	30
Final Qty(g)	21.56	21.61	21.57	21.59	21.66	21.6
Loss(g)	8.44	8.39	8.43	8.41	8.34	8.4
Yield (%)	71.9	72.03	71.9	71.7	72.2	71.9

Each ingredient was taken in the quantity mentioned in the Table 8.23 for all the batches to convert it in to the fine powder. Detail of all batches are mentioned in the **Table 8.24**

8.4.3 Preparation of pastes

Table: 8.25 Quantity of ingredients for preparation of paste.

Batch	Wt. of kharjura				Wt. of Munnaka			
	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)	Initial weight (g)	Final weight (g)	Loss (g)	Yield (%)
I	40	35.2	4.8	88	40	38.4	1.6	96
II	40	34.7	5.3	86.7	40	38.7	1.3	96.8
III	40	34.9	5.1	87.2	40	37.8	2.2	94.5
IV	40	34.3	5.7	85.7	40	38.8	1.2	97

V	40	35.1	4.9	87.8	40	39.1	0.9	97.6
Average	40	34.8	5.2	87.08	40	38.6	1.44	96.4

Pastes of kharjura and munnaka were prepared for the preparation of avaleha. Detail observations are mentioned in the Table: 8.25.

8.4.4 Results of granules preparation:

Table: 8.26 Results of the granules preparation:

Sr. No.	Parameters	Batch					Avg.
		I	II	III	IV	V	
1	Total quantity of all ingredients (g)	141	141	141	141	141	141
2	Final quantity of the granules (g)	98.71	97.35	97.21	98.95	97.38	97.92
3	Yield (%)	70	69.04	68.9	70.2	69.06	69.44

The average final weight of the granules was 97.92 g. The average yield of granules was 69.44%. The loss occurred due to the stickiness of bolus. The details of the different batches are mentioned in **Table: 8.26**

8.5 Analysis of finished products:

- Analysis of eladi gutika
- Analysis of avaleha
- Analysis of granules

8.5.1 Pharmaceutical analysis of Eladi gutika:

8.5.1.1 Organoleptic study of eladi gutika

Table 8.27: Observation of organoleptic parameters of eladi gutika

Sr. no	Paramete rs	Observation of Batch I	Observation of Batch II	Observation of Batch III	Observation of Batch IV	Observation of Batch V
1	Colour	Dark brown	Dark brown	Dark brown	Dark brown	Dark brown

2	Odour	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
3	Taste	Sweet, bitter	Sweet, bitter	Sweet, bitter	Sweet, bitter	Sweet, bitter
4	Texture	Smooth	Smooth	Smooth	Smooth	Smooth

8.5.1.2 Physicochemical analysis of eladi gutika:

Table:8.28 Physicochemical evaluation of eladi gutika

Sr.no	Parameter						Average
		I	II	III	IV	V	
1	pH	7.6	7.4	7.5	7.7	7.9	7.62
2	Loss on drying (%)	8.03	7.9	8.2	8.3	8.5	8.18
3	Total Ash (%)	2.81	2.6	2.5	2.9	3.1	2.78
4	Acid insoluble ash (%)	0.49	0.47	0.44	0.51	0.53	0.49
5	Water soluble ash (%)	1.39	1.27	1.25	1.42	1.46	1.35
6	Water soluble extractive value (%)	47.2	46.7	46.5	47.5	47.9	47.2
7	Alcohol soluble extractive value (%)	51.1	49.7	49.3	51.4	52.1	50.72
8	Weight variation	Pass	Pass	Pass	Pass	Pass	Pass

Disintegration, friability and hardness of gutika were not performed due to the big size of the gutika. The results of remaining parameters for the different batches of gutika are mentioned in the Table: 8.28.

8.5.2 Pharmaceutical analysis of Avaleha

8.5.2.1 Evaluation parameters of Kwatha

The prepared kwatha were evaluated by using organoleptic and physicochemical parameters.

Table: 8.29 Evaluation Parameters of Kwatha

Parameter	Batch I	Batch II	Batch III	Batch IV	Batch V

Color	Blackish brown	Blackish brown	Blackish brown	Blackish brown	Blackish brown
Odour	Characteristic	Characteristic	Characteristic	Characteristic	Characteristic
Form	Liquid	Liquid	Liquid	Liquid	Liquid
pH	6.1	6.3	6.5	6.3	6.5
Total solid content	42.4	43.7	47.1	43.7	47.1
Refractive Index	3.35	3.35	3.35	3.35	3.35

Kwatha of each batch was evaluated by using organoleptic and physicochemical parameters. No significant difference was found in any of the parameter. Results of all batches for different parameters are mentioned in **Table 8.29**

8.5.2.2 Organoleptic study of Avaleha

Table: 8.30 Results of the organoleptic parameters of avaleha

Parameter	Batches				
	I	II	III	IV	V
Colour	Blackish brown	Blackish brown	Blackish brown	Blackish brown	Blackish brown
Odour	Characteristic	Characteristic	Characteristics	Characteristic	Characteristic
Taste	Sweet, astringent	Sweet, astringent	Sweet, astringent	Sweet, astringent	Sweet, astringent
Form	Semisolid	Semisolid	Semisolid	Semisolid	Semisolid

Organoleptic parameters for the different batches were same. The results of the organoleptic study are mentioned in the **Table: 8.30**

8.5.2.3 Physicochemical study of avaleha

Table 8.31: Physicochemical parameters of Avaleha:

Parameter	Batches					Average
	I	II	III	IV	V	
pH	8.01	8.0	8.07	8.1	7.9	8.01
Loss on drying at 105°C (%)	37.84	38.31	37.63	37.82	37.13	37.74
Total Ash (%)	2.16	2.11	2.12	2.15	2.09	2.12
Acid insoluble ash (%)	1.3	1.4	1.7	1.5	1.1	1.4
Fat content (%)	13.6	17.4	14.3	15.1	13.3	14.74
Total solid content (%)	76.3	75	76.9	76.7	75.9	76.16

No significant variation was observed in the physico-chemical study in different batches of avaleha.as mentioned in the **Table:8.31**

8.5.3 Analysis of granules

8.5.3.1 Organoleptic study of granules:

Table:8.32 Observation of organoleptic parameters of granules

Parameter	Batches				
	I	II	III	IV	V
Colour	Dark brown	Dark brown	Dark brown	Dark brown	Dark brown
Odour	Characteristic.	Characteristic.	Characteristic.	Characteristic	Characteristic
Taste	Sweet, astringent	Sweet, astringent	Sweet, astringent	Sweet, astringent	Sweet, astringent

No significant variation was observed in the organoleptic evaluation of different batches of granules. The details of the observations are mentioned in the **Table 8.32**

8.5.3.2 Physicochemical study of granules:

Table 8.33: Observation of physicochemical analysis of granules

Parameter	Batches					Average
	I	II	III	IV	V	
pH	8.4	8.6	8.2	8.3	8.8	8.48
Loss on drying (%)	5.25	5.55	5.39	5.42	5.27	5.38
Total Ash (%)	2.9	2.6	2.81	2.63	2.7	2.72
Water soluble extractive value (%)	48.8	48.1	48.3	48.7	48.4	48.5
Alcohol soluble extractive value (%)	38.1	38.6	39.1	38.4	38.8	38.6
Angle of repose (%)	25	25	25	25	25	25
Bulk density (%)	0.729	0.738	0.727	0.735	0.731	0.73

No significant variation was observed in the physico-chemical parameters of different batches of granules. The results of physico-chemical parameters of different batches of granules are mentioned in **Table:8.33**

8.6 Qualitative analysis of gutika, avaleha, and granules:

Table 8.34: Results of qualitative tests of Gutika, Avaleha, Granules:

Components	Chemical test	Observation	Gutika	Avaleha	Granules
Alkaloids	Dragondroff's test	Red Precipitates	+	+	+
	Mayer's test	Red precipitates	+	+	+
Tannins	Ferric chloride test	Greenish black color	+	+	+
Flavanoid	Shinoda	Pink color	+	+	+
Carbohydrates	Fehling Test	Brick Red	+	+	+
Glycoside: Cardiac glycosides	Keller-killani	At junction two different	+	-	+

Saponon glycosides	test Foam test	coloured layers are observed Froth formation	+	-	+
Test for steroids	Salowski test		-	-	-
Test for reducing sugar	Benedict test	Yellow colour	+	+	+
	Fehling test	Yellow colour	+		
Test for non- reducing polysaccharides (starch)			+	+	+
Test for pentose sugar	Bial's test		-	-	-
Test for non- reducing sugar			+	+	+
Test for monosaccharides	Barfoed's test		-	-	-
Test for gum			+	+	+
Test for hexose sugar			-	-	-
Test for protein	Milion's test	Red color precipitates	+	+	+
Test for amino acid	Ninhydrin test	Purple color	+	+	+

Tannins, flavanoids, carbohydrates, reducing sugars, proteins are present in the formulations
As mention in the **Table 8.34**

(+)sign=presence of constituents,(-) sign= Absence of constituents.

8.7. Chromatographic analysis of Eladi Gutika , Avaleha, Granules

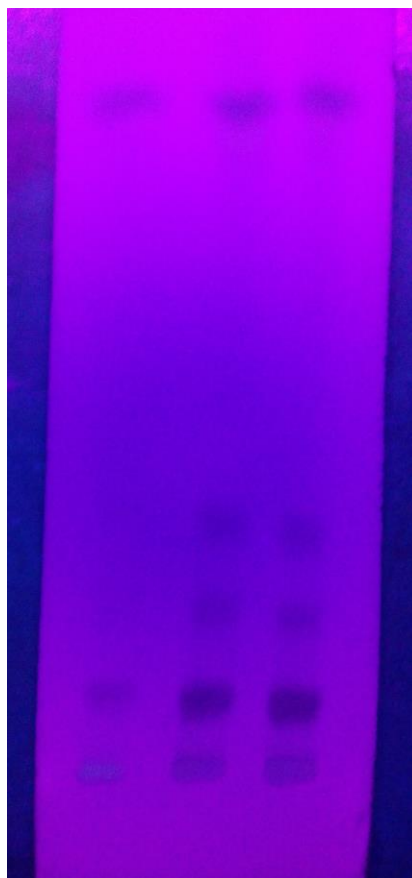


Fig 10: TLC of avaleha, gutika, and granules in long U.V

Table 8.35: Rf values of formulations

Sample	Solvent system	Rf. value (short UV)
Eladi Gutika	Toluene : Ethyl acetate : Formic acid (9.2:9.2:1.5)	0.08,0.081,0.90,0.95
Avaleha	Toluene : Ethyl acetate : Formic acid (9.2:9.2:1.5)	0.08,0.82,0.9
Granules	Toluene : Ethyl acetate : Formic acid (9.2:9.2:1.5)	0.08,0.79,0.92,0.95

TLC analysis of the formulations gave the number of separation in same mobile phase. The details of the observation is mentioned in **Table 8.35**.

8.7.1 HPTLC profile:

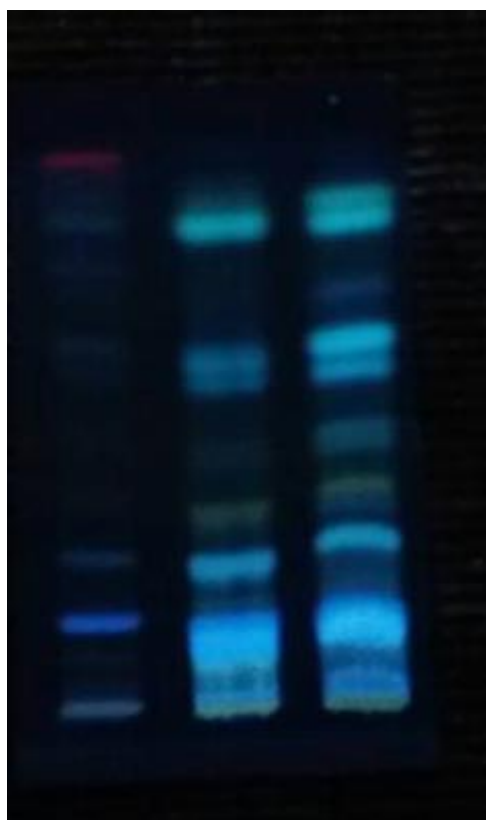


Fig. 11: HPTLC plate of finished products

Table: 8.36 Rf values of formulations found in HPTLC:

Sr. No.	Rf value		
	Granules	Gutika	Avaleha
1	0.07	0.07	0.07
2	0.19	0.14	0.17
3	0.32	0.32	0.35
4	0.37	0.42	0.42
5	0.45	0.49	0.50
6	0.55	0.65	0.57
7	0.69	0.72	0.66
8	0.81	0.77	0.78
9	0.86	0.84	0.84
10		0.91	

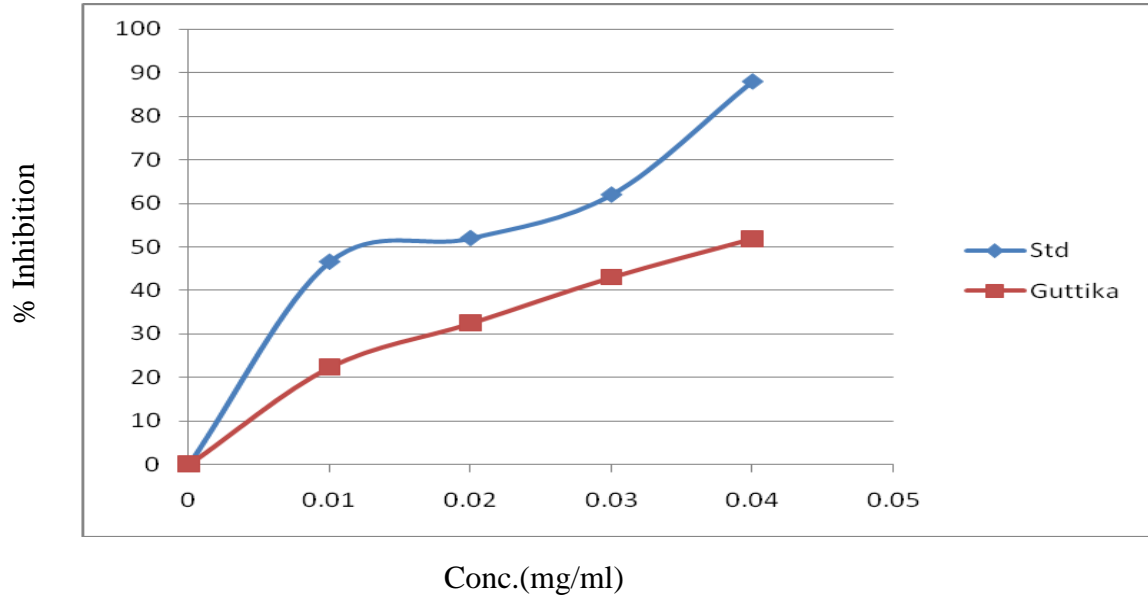
10 Rf were found in gutika which shows the presence of 10 different chemical constituents. Whereas, 9 spots were found in granules and avleha. The detail results of HPTLC study are mentioned in **Table: 8.36**. Common Rf in all three products is 0.07.

8. 8 Anti-oxidant activities of Gutika, Avaleha, Granules

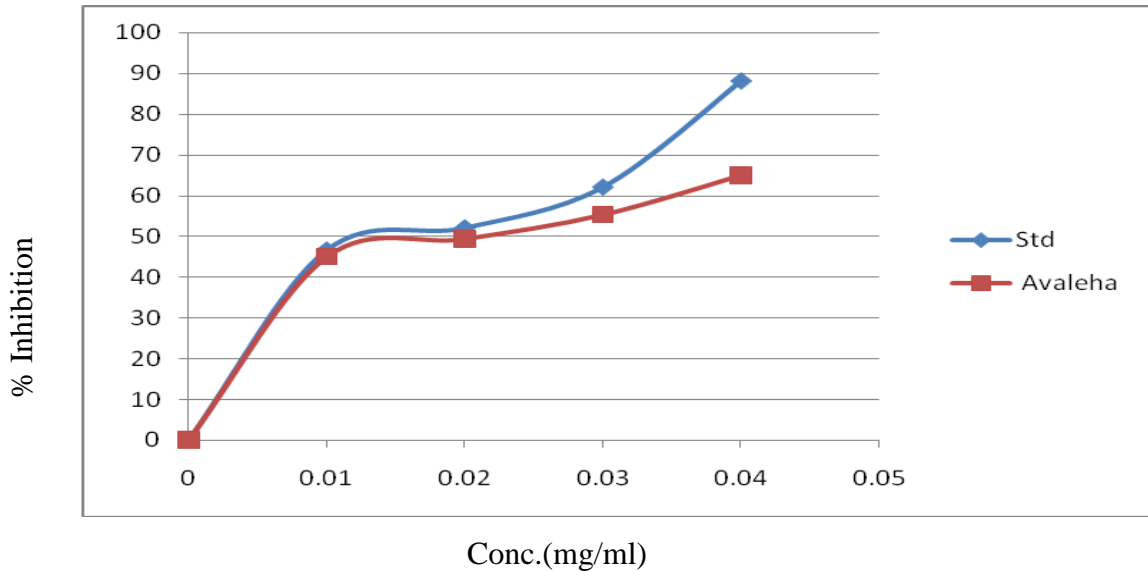
8.8.1 Antioxidant activity of Eladi gutika granules:

DPPH scavenging activity of the Eladi gutika and ascorbic acid as a standard at different concentrations.

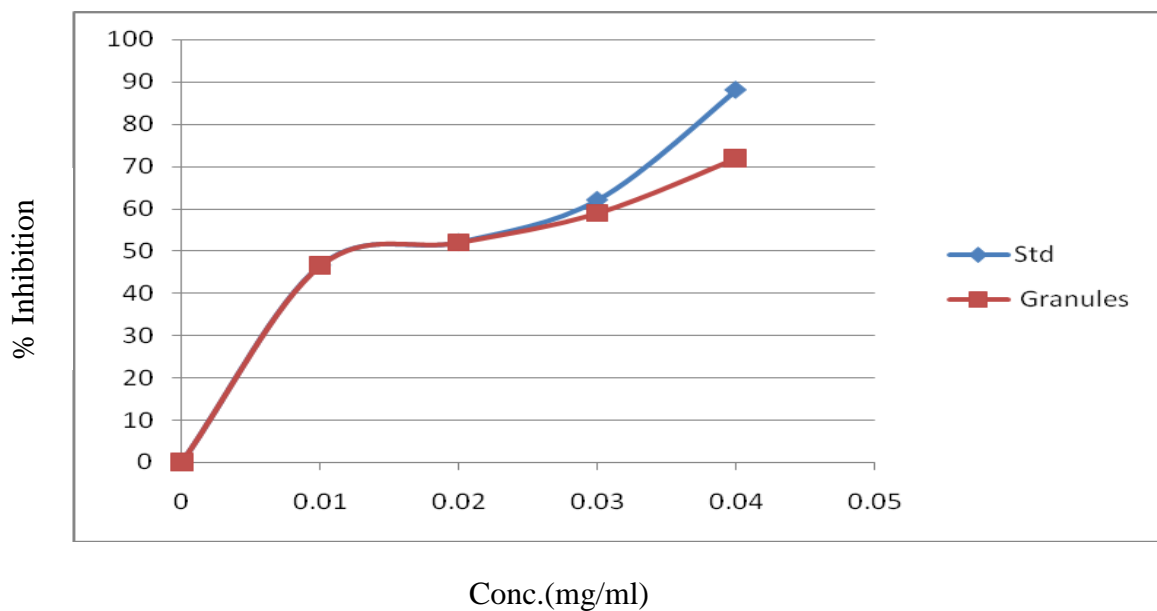
8.8.2 Graphical representation: Antioxidant activity of the Eladi gutika



Graph 1: Graphical representaion of antioxidant activity of eladi gutika



Graph 2: Graphical representaion of antioxidant activity of avaleha



Graph 3: Graphical representation of antioxidant activity of granules

Table 8.37: Antioxidant activity of Eladi gutika, Avaleha and granules:

Sr.no	Concentration (mg/ml)	Standard Ascorbic acid	Eladi gutika (%)	Avaleha	Granules
1	0.01	46.56	22.34	45	46.52
2	0.02	52	32.45	49.37	52
3	0.03	62	43.02	55.31	59
4	0.04	88	51.89	65	72

The percentage inhibition of the of the eladi gutika, avaleha, and granules for DPPH free radical mentioned in **Table: 8.37** the DPPH scavenging activity of the above formulation at 0.04 mg/ml concentration which was the higher concentration of the sample were 51.89, 65, 72 respectively. As equivalent in the percentage inhibition values of test sample in comparison to ascorbic acid i.e. the standard for the scavenging the radicals. So, the granules prepared from the eladi gutika has higher antioxidant activity in comparison to avaleha and gutika.

CHAPTER –IX

CONCLUSION AND FUTURE SCOPE

Eladi gutika is a polyherbal formulation used for the treatment of hiccup (hikka), vertigo (bhrama), mada (intoxication), fever (jvara), and rheumatism (amavata). However, the high dose of eladi gutika makes its administration difficult to all age groups. Therefore, in the present study avaleha and granules including the eladi gutika were prepared by using same ingredients as mentioned in Ayurvedic Formulary of India.

Ingredients were procured, authenticated and checked for the quality as per the monograph. Traditional methods of gutika and avaleha were used during the study. Whereas, wet granulation method was used for the preparation of granules. The Average yield of eladi gutika, avaleha and granules were 79.44 %, 78.11 % and 69.44 % respectively. No significant difference was found in the qualitative tests of all formulations. In HPTLC profile, 9 spots were observed for the granules and avaleha. Whereas, 10 spots in eladi gutika. Besides, *in-vitro* anti-oxidant activity of the formulations revealed that granules and avaleha are more effective than eladi gutika, respectively.

Future Scope: *In-vivo* and clinical study are required to establish these dosage forms as alternate for the gutika.

CHAPTER -X

References

- 1 S.S Savikar etal. An Ayurvedic Pharmaceutics- An over view.AJJCAM2010;7(3):174-184
- 2 <https://www.ukessays.com/essays/engineering/advantages-and-disadvantages-of-tablets-in-pharmaceutical-industry-engineering-essay.php> Date 11 dec2016
- 3 The Ayurvedic Pharmacopoeia of India, Part II (Formulations) Volume-1, First edition;97
- 4 Sargadhara. Brahmanand Tripathi. Sarngadhara-Samhita. Madhyam khanda. 7/1,7/4-5, Chaukhamba Surbharti Prakshan Varanasi. Edition 2006 ;195
- 5 Dr. P.V.N.R.Prasad. Bhaisajya Kalpana vijnana. Chowkhama Krishanadas Academy Varanasi. first Edition 2008;206
- 6 Dr. P.V.N.R. Prasad. Bhaisajya Kalpana vijnana. Chowkhama Krishanadas Academy Varanasi. first Edition 2008;185-188
- 7 Sharangadhara. Brahmanand Tripathi. Sarngadhara-Samhita. Madhyama Khand 8/1, first Edition. Chaukhambha Surbharati Prakashan Varanasi.2006;206
- 8 Charak Chikitsa Sthana 1-1/62-74; Vaidya Jadavaji Trikamji Acharya Chaukhambha Orientalia, Varanasi 2008; Pg 379 .
- 9 Astanga hridaya Chikitsa Sthana.8/108-111; vaidya Lalchand. 1st ed, Motilal Banarasidas, Varanasi 1999; Pg.437
- 10 Sharangadhara. Brahmanand Tripathi. Sarngadhara-Samhita. Madhyama Khand 8/1,Chaukhambha Surbharati Prakashan Varanasi. Edition 2010;210
- 11 <http://kinam.com/Lectures/363/2.%20Powders%20&%20Granules%20Text.pdf> Date 4 May 2017
- 12 Agnivesa. Vaidyamanorma. Carakasamhita . chaukhamba Sanskrit Pratisthan Delhi Vol –I. Edition 2007;269
- 13 Dr. Chandrabhushan Jha. Yogtarangini. Chaukhambha vidyabhavan.Varanasi;162
- 14 Krishan Gopal. Rasatantrasara Sidh -Pryogsanghra. Krishan Gopal Ayurveda Bhavan Ajmer dwitya Khand;644
- 15 Kaviraja Ambikadutta shastri. Bhaishjaya ratnavali .Chaukhambha Prakshan Varanasi;`42-44/316
- 16 The Ayurvedic Pharmacopoeia of India.Part.I volumeI;168-169

-
- 17 Elizabeth M Williamson. Major herbs of Ayurveda. Edition 2002;157
 - 18 <http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:496941-1> (Date 7 Dec 2016)
 - 19 Agnivesa. Vaidyamanorma .Carakasamhita .Chaukhamba Sanskrit Pratisthan Delhi vol –II. Edition 2007;41,78,82,79,87,94
 - 20 Susruta. Kaviraja Ambikadutta shastri. Susrutasamhita;42-44
 - 21 Dr.G.S.Pandey. Bhavaprakasa Nighantu. Chaukhamba Bharti Academy. Edition2004;65-66
 - 22 Acarya vishvanath dwivedi. Raj nighantu. Chaukhamba Krishandas Academy Varanasi. Edition 2006;164/144-145
 - 23 http://ayurveda-foryou.com/ayurveda_herb/yashtimadhu.html (Date 4Dec 2016)
 - 24 <https://www.ayurtimes.com/liquorice-licorice-mulethi-yashtimadhu-glycyrrhiza-glabra/> (Date 5 Dec 2016)
 - 25 www.Ayushveda.com/herb/glycyrrhiza.glabra.htm#top (Date 13Oct2016)
 - 26 <http://herbsvedha.blogspot.in/2014/12/botanical-name-glycyrrhiza-glabra-linn.html> (Date 7 Oct 2016)
 - 27 The Ayurvedic Pharmacopoeia of India Part.I.Vol.III;45,46
 - 28 A.k.Nadkarni. Indian Materia Medica. bombay popular prakashan. Second Edition:1927;1287
 - 29 Agnivesa. Vaidyamanorma. Carakasamhita. chaukhamba Sanskrit pratisthan Delhi. Vol –II. Edition 2007;87
 - 30 Kaviraja Ambikadutta shastri. Susrutasamhita ;43
 - 31 Guru Prasad Sharma. Dhanvanri Nighantu.Chaukhmba Orientala Varanasi. Fourth Edition 2005;157
 - 32 <http://hashmidawakhana.co.in/vitis-vinifera-linn.html> (Date 22 Nov.2016)
 - 33 <http://www.healthgrace.in/2013/10/benefits-of-eating-dry-fruit-raisins.html/> (Date 21 oct 2016)
 - 34 <https://truweight.in/blog/healthy-snacks/raisins-munakka-weight-loss-healthbenefits.html> (Date 26 Nov.2016)
 - 35 The Ayurvedic Pharmacopoeia of India. PartI.Vol I;136-137
 - 36 <http://www.iloveindia.com/indian-herbs/cinnamon.html> (12 February 2017)
 - 37 <http://www.hindustanspicesthekkady.com/spices/> (7 January 2017)

-
- 38 Agnivesa .Vaidyamanorma. Carakasamhita. Chaukhamba Sanskrit Pratisthan Delhi. Vol –II. Edition 2007;40,41,94
- 39 Maharsri-susruta. Kaviraja Ambikadutta shastri. Susrutasamhita. Part II;42
- 40 Dr.GangaSahya Pandey. Bhavaprakasha Nighantu. Chaukhamba Bharti Academy. Edition 2004;63
- 41 Bapalala G.Vaidya. Nighantu Adarsha. Chaukhamba Bharti Academy.Vol.II 2005; 580-584.
- 42 Prof. Priya Vrat Sharma. Priyanighantuh. Chaukhmba surbharti Prakashan Varanasi. Edition 2004;22
- 43 <http://worldbestspices.com/aboutela.html> (Date 9 Oct 2016)
- 44 Dr.Mohammed Ali. Text book of Pharmacognosy. CBS Publishers & Distributors PVT.LTD. First Edition 2010;207
- 45 S.S.Handa & V.K.Kapoor. Text book of Pharmacognosy. Vallabh Prakashan. First Edition 2001;104
- 46 The ayurvedic Pharmacopoeia of India. Part.I vol.I; 151-152.
- 47 Dr. Mohammed Ali. Text Book of Pharmacognosy. CBS Publishers & Distributors PVT.LTD. First Edition 2010;185-187
- 48 Dr.GangaSahya Pandey. Bhavaprakasha Nighantu. Chaukhamba Bharti Academy. Edition 2004;222-224
- 49 Bapalala G.Vaidya. Nighantu Adarsha. Chaukhamba Bharti Academy.Vol.II. Edition 2005; 382-385
- 50 Rajvaidya. P.Shankar Datt.Goad . Shankar Nighantu. Chaukhamba Videya Bhavan. Edition 2002;112
- 51 http://ayurveda-foryou.com/ayurveda_herb/cinnamon.html (Jan 16 2017)
- 52 The ayurvedic Pharmacopoeia of India. Part –I. Vol I;151-152
- 53 <http://www.indianspices.com/spices-development/spice-catalogue?page=4> (3oct2016)
- 54 Agnivesa. Vaidyamanorma. Carakasamhita. Chaukhamba Sanskrit Pratisthan Delhi. Vol.II. Edition 2007;269
- 55 Dr.GangaSahya Pandey. Bhavaprakasha Nighantu. Chaukhamba Bharti Academy. Edition 2004 ;229

-
- 56 Bapalala G. Vaidya. Nighantu Adarsha. Chaukhamba Bharti Academy. Vol II. Edition 2005;380-381
- 57 Rajvaidya. P. Shankar datt, goad. Shankar Nighantu. Chaukhamba Videya Bhavan. Edition 2002;113
- 58 <http://www.iloveindia.com/indian-herbs/cinnamon.html> (Date 22Nov 2016)
- 59 The Ayurvedic Pharmacopoeia of India. Part-I. Vol-I;104-105.
- 60 Dr. Mohammed Ali. Text Book of Pharmacognosy. CBS Publishers & Distributors PVT.LTD. First Edition 2010;357-358.
- 61 Elizabeth M Williamson. Major herbs of Ayurveda. Churchill livinging stone. Edition 2002;225
- 62 Prof. Priyavrat Sharma. Caraha-samhita. Chaukhambha orientalia. 18th Edition. 2007;180
- 63 Dr. GangaSahya Pandey. Bhavaprakasha Nighantu. Chaukhamba Bharti Academy. Edition 2004;15
- 64 Bapalala G. Vaidya. Nighantu Adarsha. Chaukhamba Bharti Academy. Vol. II. Edition 2005; 357
- 65 Guru Prasad Sharma, Dhanvantri Nighantu, Chaukhambha Orientalia ;83
- 66 The Ayurvedic Pharmacopoeia of India Part I. Vol. IV; 104-105
- 67 <http://www.fao.org/docrep/006/y4360e/y4360e05.htm> (Date 12 Nov. 2016)
- 68 Dr. GangaSahya Pandey. Bhavaprakasha Nighantu. Chaukhamba Bharti Academy. Edition 2004 ;587-588
- 69 Guru Prasad Sharma. Dhanvantri Nighantu. Chaukhambha Orientalia ;157
- 70 <http://www.bhtips.com/2013/11/datekhajoor-16-health-benefits-and.html> (Date 5 Dec. 2016)
- 71 <http://www.bhtips.com/2013/11/datekhajoor-16-health-benefits-and.html> (Date 7 Dec. 2016)
- 72 <http://www.bhtips.com/2013/11/datekhajoor-16-health-benefits-and.html> (Date 5 Nov. 2016)
- 73 The Ayurvedic Pharmacopoeia of India. Part. I. Vol. II;248
- 74 Agnivesa. Gangasahaya Pandeya. A.M.S, Caraka Samhita . Edition 2006; 269
- 75 M.S. Valiathan. The Legacy of Susruta. Orient Longman. Edition 2007;352
- 76 M.S Valiathan. The Legacy of Susruta. Orient Longman. Section IV-Chapter 8;71
- 77 Manisha Deb Mandal. Shyamapada Mandal. Honey. its medicinal Property and antibacterial activity. Asian Pacific Journal of Topical Biomedicine (2011)154-160

-
- 78 <https://draxe.com/top-20-uses-for-honey/> (Date 5 Dec.2016)
- 79 Agnivesa,Vaidyamanorma,Charkasamhita.Chaukhamba Sanskrit partisthan Delhi .Vol.I. edition 2007;269
- 80 Dr. Chandrabhushan jha. Yogtarangini. Chaukhambha vidyabhavan.Varanasi;162
- 81 Krishan Gopal. Rasatantrasara Sidh -Pryogsanghra. Krishan Gopal Ayurveda Bhavan Ajmer dwitya Khand;644
- 82 <http://thatsthesecretformula.blogspot.in/2011/11/mishri-rock-candy.html> Date 27 Nov 2016
- 83 <http://khoobsurati.com/benefits-of-sugar-candy-mishri.html> (Date 9 Dec 2016)
- 84 <http://www.thehealthsite.com/diseases-conditions/health-benefits-of-mishri-or-rock-sugar/> 5 Nov. 2016
- 85 <http://1000naturalremedy.com/9-health-benefits-mishri/> (Date 5 Dec.2016)
- 86 (Anonyms):The protocol for testing Ayurvedic, Sidha, Unani Medicine, Pharmacopoeial laboratory for Indian medicine Ghazibad,Govt. of India, Ministry of Health and Family Welfare, Department of Ayush ; 20
- 87 The Ayurvedic Pharmacopeia of India, Govt. of India, Controller of Publications, New Delhi, 1st ed.1999, part I, Vol.-II ;191
- 88 Dr. Mohammed Ali. Textbook of pharmacognosy. CBS Publishers and distributors PVT.LTD. First edition,2010;283
- 89 Dr. Mohammed Ali. Textbook of pharmacognosy. CBS Publishers and distributors PVT.LTD. First edition,2010;96-97
- 90 Dr. Mohammed Ali. Textbook of pharmacognosy. CBS Publishers and distributors PVT.LTD. First edition,2010;64-65
- 91 Dr. Khandelwal K.R. Practical Pharmacognosy, Nirali prakashan.16th Edition. 2006 ;149
- 92 Dr. Khandelwal K.R. Practical Pharmacognosy, Nirali prakashan.16th Edition. 2006 ;151
- ⁹³(Anonymous)Protocol For Testing Ayurvedic ,Siddha & Unani medicines.Govt. of India Department of AUSH ministry of health & family Welfare, pharmacopoeial laboratory for Indian medicine Ghaziabad
- 94 http://shodhganga.inflibnet.ac.in/bitstream/10603/10285/8/08_chapter-iii.pdf (Date 3 Mach 2017)

-
- 95 (Anonyms): The protocol for testing Ayurvedic, Sidha, Unani Medicine, Pharmacopoeial laboratory for Indian medicine Ghaziabad, Govt. of India, Ministry of Health and Family Welfare, Department of Ayush, p.no.56-57
- 96 (Anonyms): The protocol for testing Ayurvedic, Sidha, Unani Medicine, Pharmacopoeial laboratory for Indian medicine Ghaziabad, Govt. of India, Ministry of Health and Family Welfare, Department of Ayush, p.no.112
- 97 <https://www.britannica.com/science/refractive-index> (Date 16 aprill 2017)
- 98 (Anonyms): The protocol for testing Ayurvedic, Sidha, Unani Medicine, Pharmacopoeial laboratory for Indian medicine Ghaziabad, Govt. of India, Ministry of Health and Family Welfare, Department of Ayush, p.no124,125.126
- 99 https://www.jstor.org/stable/2347313?seq=1#page_scan_tab_contents 8th may 2017
- 100 (Anonyms): The protocol for testing Ayurvedic, Sidha, Unani Medicine, Pharmacopoeial laboratory for Indian medicine Ghaziabad, Govt. of India, Ministry of Health and Family Welfare, Department of Ayush, p.no 57.
- 101 <https://beautifulf.wordpress.com/2013/12/21/practical-4-angle-of-repose/> 8th may 2017
- 102 Monica Locatelli, Roberto gindro et.al.Study of the DPPH-Scavenging activity: Development of a free softwear for the correct interpretation of data,Food chemistry 2009; 114: 889-897

TOPIC APPROVAL PERFORMA

LIT (Pharmacy)/Department of Pharmaceutical Sciences

Program : P570-NN7::M.Pharm. (Ayurveda)

COURSE CODE : APH623

REGULAR/BACKLOG : Regular

GROUP NUMBER : PHRRGD0038

Supervisor Name : Dr. Manish Vyas

UID : 17410

Designation : Associate Professor

Qualification : _____

Research Experience : _____

SR.NO.	NAME OF STUDENT	REGISTRATION NO	BATCH	SECTION	CONTACT NUMBER
1	Neha Kumari	11501325	2015	Y1553	8988068874

SPECIALIZATION AREA : Ayurvedic Pharmacy

Supervisor Signature: _____

PROPOSED TOPIC : Pharmaceutical development and evaluation of different dosage forms of eladi gutika

Qualitative Assessment of Proposed Topic by PAC		
Sr.No.	Parameter	Rating (out of 10)
1	Project Novelty: Potential of the project to create new knowledge	8.00
2	Project Feasibility: Project can be timely carried out in-house with low-cost and available resources in the University by the students.	7.00
3	Project Academic Inputs: Project topic is relevant and makes extensive use of academic inputs in UG program and serves as a culminating effort for core study area of the degree program.	7.00
4	Project Supervision: Project supervisor's is technically competent to guide students, resolve any issues, and impart necessary skills.	8.00
5	Social Applicability: Project work intends to solve a practical problem.	7.00
6	Future Scope: Project has potential to become basis of future research work, publication or patent.	7.00

PAC Committee Members		
PAC Member 1 Name: Dr. Amit Mittal	UID: 13145	Recommended (Y/N): NA
PAC Member 2 Name: Saurabh Singh	UID: 12208	Recommended (Y/N): Yes
PAC Member 3 Name: Dr. S. Tamilvanan	UID: 16391	Recommended (Y/N): NA
PAC Member 4 Name: Dr. Navneet Khurana	UID: 18252	Recommended (Y/N): NA
DAA Nominee Name: Dr. Sazal Patyar	UID: 17050	Recommended (Y/N): NA

Final Topic Approved by PAC: Pharmaceutical development and evaluation of different dosage forms of eladi gutika

Overall Remarks: Approved

PAC CHAIRPERSON Name: 11045::Dr. Monica Gulati

Approval Date: 29 Nov 2016



ਬੋਟੈਨੀਕਲ ਐਂਡ ਐਨਵਾਇਰਨਮੈਂਟਲ ਸਾਇੰਸਿਜ਼ ਵਿਭਾਗ
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ - 143 005

Department of Botanical & Environmental Sciences
Guru Nanak Dev University, Amritsar - 143 005, India

(Established by the State Legislature Act No. 21 of 1969)

Accredited at "A" grade level by NAAC and awarded "University with Potential for Excellence" status by UGC

Ref. No. 1337 Bot. & Env. Sc.

Dated 24-11-2016

To Whom It May Concern

Regn. No. 11501325 The plant specimen(s) brought by Ms. Neha Kumari student of M. Pharmacy (Ayurveda) L.P.U (Phagwara) Ph. belongs to the following species.

1. ✓ Elettaria Cardamom
2. Cinnamomum Tamala
3. Cinnamomum zeylanicum
4. Piper Longum

Signature of Student Neha Sugar

Herbarium Assistant [Signature]

Teachers Incharge [Signature]

6. Glycyrrhiza glabra
7. Phoenix dactylifera
8. Vitis vinifera
9. Madhu (Honey)

Head
Dept. of Botanical &
Environmental Sciences
Guru Nanak Dev University,
Amritsar-143005.

winCATS Planar Chromatography Manager

Herbal Health Research Consortium
Amritsar 143 001
Punjab

Analysis Report

SOP document
Validated Design
Description :
Analysis
Created/used by E:\DATA\Project 260417.cna
Admin Wednesday, April 26, 2017 10:15:47 AM
Current user Admin

Stationary phase

Executed by Admin Wednesday, April 26, 2017 9:38:07 AM
Plate size (X x Y) 6.0 x 10.0 cm
Material
Manufacturer
Batch
GLP code
Pre-washing No
Modification No

Definitions - Quantification

Executed by Admin Wednesday, April 26, 2017 9:38:08 AM

Calibration parameters

Calibration mode Single level
Statistics mode CV
Evaluation mode Peak Height & Area

Samples

Sample ID: Gr
Sample ID: Gu
Sample ID: A

Sample application - CAMAG Linomat 5

Instrument CAMAG Linomat 5 "Linomat5_180745" S/N 180745 (1.00.12)
Executed by Admin Wednesday, April 26, 2017 9:49:01 AM

Linomat 5 application parameters

Spray gas : Inert gas
Sample solvent type : Methanol
Dosage speed : 150 nl/s
Predosage volume : 0.2 ul

Sequence

Syringe size: 100 µl
Number of tracks: 3
Application position Y : 8.0 mm
Band length : 10.0 mm

No.	Appl. position	Appl. volume	Vial #	Sample ID	Active
>1	10.0 mm	15.0 µl	1	Gr	Yes
>2	30.0 mm	15.0 µl	2	Gu	Yes
>3	50.0 mm	15.0 µl	3	A	Yes

User : Admin
Wednesday, April 26, 2017 10:15:48 AM

Approved :
Report ID : 07E1041A040A0F2F

SN 1809W062, V1.4.6
Page 1 of 5

winCATS Planar Chromatography Manager

Detection - CAMAG TLC Scanner

Information

Application position 8.0 mm
Solvent front position 85.0 mm

Instrument

Executed by Admin
Number of tracks 3
Position of first track X 10.0 mm
Distance between tracks 20.0 mm
Scan start pos. Y 5.0 mm
Scan end pos. Y 85.0 mm
Slit dimensions 4.00 x 0.30 mm, Micro
Optimize optical system Light
Scanning speed: 20 mm/s
Data resolution: 100 µm/step

CAMAG TLC Scanner "Scanner_180710" S/N 180710 (2.01.02)
Wednesday, April 26, 2017 10:15:28 AM

Measurement Table

Wavelength 366
Lamp D2 & W
Measurement Type Remission
Measurement Mode Absorption
Optical filter Second order
Detector mode Automatic
PM high voltage 355 V

Detector properties

Y-position for 0 adjust 5.0 mm
Track # for 0 adjust 0
Analog Offset 10%
Sensitivity Automatic (28)

Integration

Properties

Data filtering Savitsky-Golay 7
Baseline correction Lowest Slope
Peak threshold min. slope 5
Peak threshold min. height 10 AU
Peak threshold min. area 50
Peak threshold max. height 990 AU
Track start position 8.0 mm
Track end position 85.0 mm
Display scaling Automatic

winCATS Planar Chromatography Manager

Herbal Health Research Consortium
Amritsar 143 001
Punjab

Analysis Report

SOP document
Validated Design
Description :
Analysis E:\DATA\Project 260417.cna
Created/used by Admin Wednesday, April 26, 2017 10:34:21 AM
Current user Admin

Stationary phase

Executed by Admin Wednesday, April 26, 2017 9:38:07 AM
Plate size (X x Y) 6.0 x 10.0 cm
Material
Manufacturer
Batch
GLP code
Pre-washing No
Modification No

Definitions - Quantification

Executed by Admin Wednesday, April 26, 2017 9:38:08 AM

Calibration parameters

Calibration mode Single level
Statistics mode CV
Evaluation mode Peak Height & Area

Samples

Sample ID: Gr
Sample ID: Gu
Sample ID: A

Sample application - CAMAG Linomat 5

Instrument CAMAG Linomat 5 "Linomat5_180745" S/N 180745 (1.00.12)
Executed by Admin Wednesday, April 26, 2017 9:49:01 AM

Linomat 5 application parameters

Spray gas : Inert gas
Sample solvent type : Methanol
Dosage speed : 150 nl/s
Predosage volume : 0.2 ul

Sequence

Syringe size: 100 µl
Number of tracks: 3
Application position Y : 8.0 mm
Band length : 10.0 mm

No.	Appl. position	Appl. volume	Vial #	Sample ID	Active
>1	10.0 mm	15.0 µl	1	Gr	Yes
>2	30.0 mm	15.0 µl	2	Gu	Yes
>3	50.0 mm	15.0 µl	3	A	Yes

User : Admin
Wednesday, April 26, 2017 10:34:21 AM

Approved
Report ID : 07E1041A040A2215

SN 1809W062, V1.4.6
Page 1 of 5

winCATS Planar Chromatography Manager

Detection - CAMAG TLC Scanner

Information

Application position 8.0 mm
Solvent front position 85.0 mm

Instrument

Executed by CAMAG TLC Scanner "Scanner_180710" S/N 180710 (2.01.02)
Admin Wednesday, April 26, 2017 10:33:40 AM
Number of tracks 3
Position of first track X 10.0 mm
Distance between tracks 20.0 mm
Scan start pos. Y 5.0 mm
Scan end pos. Y 85.0 mm
Slit dimensions 4.00 x 0.30 mm, Micro
Optimize optical system Light
Scanning speed: 20 mm/s
Data resolution: 100 µm/step

Measurement Table

Wavelength 254
Lamp D2 & W
Measurement Type Remission
Measurement Mode Absorption
Optical filter Second order
Detector mode Automatic
PM high voltage 305 V

Detector properties

Y-position for 0 adjust 5.0 mm
Track # for 0 adjust 0
Analog Offset 10%
Sensitivity Automatic (37)

Integration

Properties

Data filtering Savitsky-Golay 7
Baseline correction Lowest Slope
5
Peak threshold min. slope 10 AU
Peak threshold min. height 50
Peak threshold min. area 990 AU
Peak threshold max. height 8.0 mm
Track start position 85.0 mm
Track end position Automatic
Display scaling