

Pharmaceutical standardization, dosage form development and comparative study with *In vitro* antiurolithic activity of Poly-herbal formulation *Trikantakadi kwath*

A THESIS

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

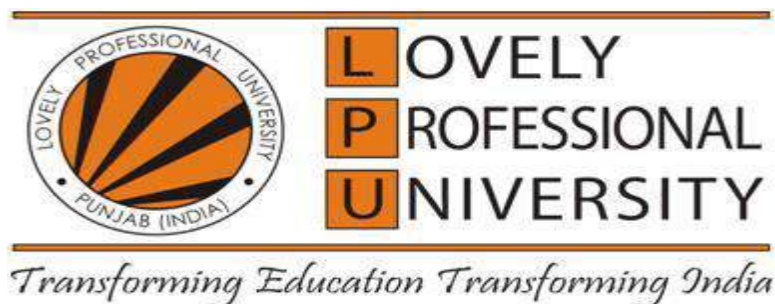
IN
RASASHASTRA AND BHAISHJYA KALPANA
BY

SWATI SHARMA

UNDER THE GUIDANCE OF

Mr. Dileep Singh Baghel

(Associate Professor)



School of Pharmaceutical Sciences

Lovely Professional University

Punjab 144411

April 2017

Statement by the candidate

This is to submit that this written submission in my thesis entitled “Pharmaceutical standardization, dosage form development and comparative study with *In vitro* antiurolithic activity of Poly- herbal formulation *Trikantakadi kwath*” 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 will be cause 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. Patents related to API, process, product, method and equipment, if any, have been examined to ensure non- infringing approach to the existing patents.

This thesis encompasses the information generated by me based on experimental work carried out in the Institute/ Industry. I ensure and hold full responsibility for its genuineness.

Ms. Swati Sharma

Forwarded Through

Mr. Dileep Singh Baghel

Associate Professor

Department of Ayurvedic Pharmacy

Lovely Professional University

Certificate by Supervisor

The work described in this thesis entitled “Pharmaceutical standardization, dosage form development and comparative study with *In vitro* antiurolithic activity of Poly- herbal formulation *Trikantakadi kwath*” has been carried out by **Ms. Swati Sharma** under my supervision. I certify that this is his bonafied work. The work described is original and has not been submitted for any degree to this or any other university.

Date:

Place:

Mr. Dileep Singh Baghel

Associate Professor

Research Supervisor

Certificate by School

This is certified that the work described in this thesis entitled “Pharmaceutical standardization, dosage form development and comparative study with *In vitro* antiurolithic activity of Poly-herbal formulation *Trikantakadi kwath*” has been carried out by **Ms. Swati Sharma** at the School of Pharmaceutical Sciences, Lovely Professional University, Punjab.

Mr. Saurabh Singh Baghel

Associate Professor

(COD)

Department of Ayurvedic Pharmacy

Prof. (Dr.) Monica Gulati

Sr. Dean

Lovely School of Pharmaceutical Sciences

*Dedicated to God and
My family*

ACKNOWLEDGEMENT

Research is an arduous task, which despite of hard labour also requires patience and courage-try, try and try again. This would only be made possible with the benediction and grace of almighty. Before we get into thick of things, I would like to add a few words of appreciation for the people who have been part of this project right from its starting. The problems I had faced would not been solved without the guidance and support of the people involved. Let us grateful to people who make us happy, they are the charming gardeners who make our souls blossoms. It is a genuine pleasure to express my deep sense of thanks and gratitude to my mentor and guide **Mr. Dileep Singh Baghel** Associate Professor, Lovely professional University, **Mr. Saurabh Singh Baghel** COD, who with their experience, immense knowledge helped me to complete my work. His perfection, advices, encouragement, assurance had made this dissertation interesting and educative.

I own a deep sense of gratitude to **Prof (Dr.) Monica Gulati** Sr. Dean, **Dr. Sachin Kumar Singh, Mr. Bimlesh Kumar & LSPS**, for providing me the facilities during the project. The financial support provided by Lovely Professional University is gratefully acknowledged.

I shall be always remain thankful to our faculty **Dr. Manish Vyas, Ms. Amrinder Kaur** for their ever helping attitude.

I would like to thank lab technicians **Ms. Sapna Soni, Mr. Prithvi Raj Swami, Mr. Vijay Kumar Pal, Mr. Satish Tiwari, Mr. Vinod Kumar** for their availability and help they provided me during this project. It is said that “If you look deeply into the palm of your hands, you will see your parents and ancestors.

I am most thankful to my Parents **Dr. Bihari Lal Sharma & Mrs. Anita Sharma, Sister Shivani and Brother Shivansh** without their support I would not able to reach up here. I thank all of you to believe in me and I promise to justify your support in future.

Friend are like stars they come and go but ones who stay are the ones who glow and I consider myself fortunate to have friends like you. I would like to thank **Sweta, Savina, Anil, Arun, Preeti, Neha, Shivangini, Ambika** and many more for bringing some of positive attitude in me. This journey without you would have been tough.

Date:

Place:

Ms. Swati Sharma

ABSTRACT

Trikantakadi kwath is one of the polyherbal classical preparation mentioned in *Ayurveda Sara Samgraha* and indicated for the treatment of *ashmari*, *mutraghat*, *mutrakricha* and to remove the kidney stone outside the body. Kidney stones are develop when oxalate, phosphorous and calcium in urine become highly concentrated. These stones causes the blood in urine and severe pain in the abdomen due to decreased urine volume. The demerits of *kwath* are stability, shelf life, non- convenient, large dosages administration, to overcome the problem with the *kwath* an effort is made for the modification in the formulation without changing its mode of administration and convert it into various dosages form such as tablet, syrup, and tincture. Pharmacognostic, physicochemical, phytochemical parameters and stability study of crude herbs and prepared formulations was carried out and perform the comparative study of all the prepared dosage form. *Trikantakadi kvatha ghana vati* exhibited better *in-vitro* antiurolithic activity as compare to other prepared formulations.

Table of Content

C. No.	Topic	Page No.
1.	Introduction	1-3
2.	Terminology	4
3.	Literature review	5-28
	3.1 Literature review on <i>kwath</i> and <i>kwath churna</i>	5-7
	3.1.1 <i>Charka Samhita</i>	6
	3.1.2 <i>Sushruta Samhita</i>	6
	3.1.3 <i>Asthanga Samghra</i>	6
	3.1.4 <i>Sharangdhara Samhita</i>	6
	3.1.5 <i>Yoga tarangini</i>	6
	3.1.6 <i>Vridhasavarishtasanghra</i>	6
	3.1.7 <i>Ayurved Sar samghra</i>	7
	3.1.8 <i>Yogratnakara</i>	7
	3.1.9 <i>Harita Samhita</i>	7
	3.2 Literature review on <i>pravahi kwath</i>	7-8
	3.2.2 <i>Ayurveda sar sangraha</i>	7
	3.2.4 review articles	8
	3.3 Literature review on <i>trikantakadi kwath</i>	8
	3.3.1 <i>Rasatantrasara Va Sidhaprayoga Sangraha</i>	8
	3.3.2 <i>Ayurveda Sara Sangaraha</i>	8
	3.4 Literature review on individual plant	8-26
	3.4.1 <i>Gokshura</i>	8-10
	3.4.1.1 <i>Dravyaguna vijnana</i>	8
	3.4.1.2 <i>Shankar Nighantu</i>	9
	3.4.1.3 <i>Rasaratna Samuchchaya</i>	9
	3.4.1.4 <i>Priyanighantuh</i>	9
	3.4.1.5 <i>Raj Nighantu</i>	9
	3.4.1.6 Controversial drugs in Indian medicine	9
	3.4.1.7 The Ayurvedic Pharmacopoeia of India	9-10
	3.4.2 <i>Kaas</i>	10-12
	3.4.2.1 <i>Dravyaguna vijnana</i>	10
	3.4.2.2 <i>Raj Nighantu</i>	11

3.4.2.3 <i>Dhanvantri Nighantu</i>	11
3.4.2.4 The Ayurvedic Pharmacopoeia of India	11-12
3.4.3 <i>Amaltaash/ Aragvadha</i>	13-15
3.4.3.1 <i>Dravyaguna vijnan</i>	13
3.4.3.2 <i>Shankar Nighantu</i>	13
3.4.3.3 <i>Priyanighantuh</i>	13
3.4.3.4 <i>Dhanvantri Nighantu</i>	13
3.4.3.5 <i>Abhinava Buti Darpana</i>	13
3.4.3.6 The Ayurvedic Pharmacopoeia of India	13-15
3.4.4 <i>Durbha</i>	15-17
3.4.4.1 <i>Dravyaguna vijnana</i>	15
3.4.4.2 <i>Shankar Nighantu</i>	15
3.4.4.3 <i>Priyanighantuh</i>	15
3.4.4.4 <i>Raj Nighantu</i>	15
3.4.4.5 The Ayurvedic Pharmacopoeia of India	15-17
3.4.5 <i>Javasha</i>	17-19
3.4.5.1 <i>Dravyaguna vijnana:-</i>	17
3.4.5.2 The Ayurvedic Pharmacopoeia of India	17-19
3.4.6 <i>Pitapapda</i>	20-22
3.4.6.1 <i>Dravyaguna vijnana</i>	20
3.4.6.2 <i>Shankar Nighantu</i>	20
3.4.6.3 <i>Raj Nighantu</i>	20
3.4.6.4 <i>Dhanvantri Nighantu</i>	20
3.4.6.5 <i>The Ayurvedic Pharmacopoeia of India</i>	20-22
3.4.7 <i>Pashana bheda</i>	22-24
3.4.7.1 <i>Dravyaguna vijnana</i>	22
3.4.7.2 <i>Shankar Nighantu</i>	22
3.4.7.3 <i>Priyanighantuh</i>	22
3.4.7.4 <i>Raj Nighantu</i>	22
3.4.7.5 Controversial drugs in Indian medicine	22
3.4.7.6 <i>Abhinava Buti Darpana</i>	22
2.4.7.7 The Ayurvedic Pharmacopoeia of India	22- 24
3.4.8 <i>Harar</i>	24-26

	3.4.8.1 <i>Dravyaguna vijnana</i>	24
	3.4.8.2 <i>Raj Nighantu</i>	24
	3.4.8.3 <i>Dhanvantri Nighantu</i>	24
	3.4.8.4 The Ayurvedic Pharmacopoeia of India	24-26
	3.5 Literature review on kidney stone	26-28
	3.5.1 The disease undergoes following consequences	27
	3.5.2 <i>Charaka samhita</i>	27
	3.5.3 <i>Shushruta Samhita</i>	27
	3.5.4 <i>Sharangadhara Samhita</i>	27
	3.5.5 <i>Madhavanidanam</i>	27
	3.5.6 <i>Yogratnakar:-</i>	27
	3.5.7 <i>Rasa ratna Samuchyakar</i>	27
	3.5.8 <i>Bhela Samhita</i>	27
	3.5.9 <i>Kasyap Samhita</i>	27
	3.5.10 <i>Roga vijyan</i>	28
	3.6 Prepared formulations	28
	3.6.1 Syrup	28
	3.6.2 Tincture	28
	3.6.3 Tablets	28
4.	Rationale and scope of the study	29
	4.1 Rationale of study	29
	4.2 Scope of the study	29
5.	Objective of study	30
	5.1 Aim and objectives	30
6.	Material and research methodology	31-34
	6.1 List of equipment used	31
	6.2 List of chemical used	31-32
	6.3 List of herbal drug used	32
	6.4 Research methodology	32-34
7.	Experimental work	35-52
	7.1 Collection of ingredients	35
	7.2 Authentication of raw herbal material	35
	7.3 Pharmacognostic study	35

	7.4 Pharmaceutical work	35-40
	7.5 Analytical study	41-46
	7.6 Quantitative estimation	46-47
	7.7 Thin Layer Chromatography	47-48
	7.8 Phytochemical investigation	49-50
	7.9 <i>In vitro</i> study	51
	7.10 Stability study	51-52
8.	Result and discussion	53-89
	8.1 Pharmacognostic and physicochemical study of ingredients	53-64
	8.2 Phytochemical investigation of raw herbal ingredients.	65-67
	8.3 Pharmaceutical study	67-68
	8.4 Analytical/ physicochemical study	69-71
	8.5 TLC profile of all prepared dosage form	72
	8.6 Phytochemical investigation of the prepared dosage forms	73
	8.7 Stability study data	74-86
	8.8 <i>In vitro</i> study	87-90
9.	Conclusion and future scope	91-93
10.	References	94-100
11.	Appendix	101-104
	11.1 Project/ Dissertation Topic Approval Performa	102
	11.2 Certification of authentication of raw herbal material	103
	11.3 Plagiarism report	104

List of Tables

T. No.	Tables	Page no
3.1	Depicting the quantity of water used and reduction of water up to quantity	5-6
3.2	Depicting the ingredients of <i>trikantakadi kwath</i>	8
6.1	Depicting the table for the equipment used	31
6.2	Depicting the table for the chemical used	31-32
6.3	List of herbal drug used	32
6.4	Evaluation Parameters of Formulations	33-34
7.1	Depicting the master formula of <i>trikantakadi kwath</i>	36
7.2	Depicting the master formula of <i>trikantakadi kwath</i> syrup	37
7.3	Depicting the master formula of <i>trikantakadi tincture</i>	38
7.4	Depicting the master formula of <i>trikantakadi kwath ghana vati</i>	39
7.5	Depicting the composition and quantity of material used	40
8.1	Depicting the organoleptic characters of <i>gokshura</i> fruits	53
8.2	Depicting the physicochemical properties of <i>gokshura</i> fruits	54
8.3	Depicting the organoleptic characters of <i>amaltaas</i> fruits	54-55
8.4	Depicting the physiochemical properties of fruit pulp of <i>amaltaas</i>	55
8.5	Depicting the organoleptic characters of <i>durbha</i> root	55-56
8.6	Depicting the physicochemical parameters of <i>durbha</i>	56-57
8.7	Depicting the organoleptic characters of <i>javasha</i>	57
8.8	Depicting the physicochemical parameters of <i>javasha</i>	58
8.9	Depicting the organoleptic characters of <i>pashanabheda</i> root	58-59
8.10	Depicting the physiochemical parameters of <i>pashanabheda</i> roots	60
8.11	Depicting the organoleptic characters of <i>harar</i> fruits	60
8.12	Depicting the physicochemical parameters of <i>harar</i> fruits	61

8.13	Depicting the organoleptic characters of <i>pitpapda</i>	62
8.14	Depicting the physicochemical parameters of <i>pitpapda</i>	63
8.15	Depicting the organoleptic characters of <i>kaasmoola</i>	63
8.16	Depicting the physicochemical parameters of <i>kaasmoola</i>	64
8.17	Depicting the phytochemical investigation of raw materials	65-67
8.18	Depicting the quantity of <i>trikantakadi kwath</i> obtained	67
8.19	Depicting the quantity of <i>trikantakadi kwath</i> syrup obtained	67
8.20	Depicting the quantity of <i>trikantakadi tincture</i> obtained	68
8.21A	Depicting the quantity of <i>trikantakadi ghana vati</i>	68
8.21B	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	68
8.22	Physicochemical parameters of <i>trikantakadi kwath</i>	69
8.23	Physicochemical parameters of <i>trikantakadi kwath</i> syrup	69-70
8.24	Physicochemical parameters of <i>trikantakadi tincture</i>	70
8.25	Analytical parameters of <i>trikantakadi ghana</i> and <i>trikantakadi ghana</i> with excipient	70-71
8.26	Depicting analytical parameters of <i>trikantakadi kwath ghana vati</i>	71
8.27	TLC of <i>trikantakadi kwath</i> , <i>trikantakadi ghana vati</i> (tablets), <i>trikantakadi kwath</i> syrup & <i>trikantakadi tincture</i>	72
8.28	Phytochemical investigation of the prepared dosage forms	73
8.29	Stability studies through physicochemical parameters of <i>trikantakadi kwath</i> syrup (after 24hr, 48hr, and 72hr at accelerated temperature conditions)	74
8.30	Stability studies through physicochemical parameters of <i>trikantakadi kwath</i> syrup (0 day)	75
8.31	Stability studies through physicochemical parameters of <i>trikantakadi kwath</i> syrup (after 6 months at 40°C ± 2°C/ 75%RH ± 5%)	75-76
8.32	Stability studies through physicochemical parameters of <i>trikantakadi tincture</i> (after 24hr, 48hr, and 72hr at accelerated temperature conditions)	76-77

8.33	Stability studies through physicochemical parameters of <i>trikantakadi</i> tincture (0 day)	77-78
8.34	Stability studies through physicochemical parameters of <i>trikantakadi</i> tincture (after 6 months at 40°C ± 2°C/ 75%RH ± 5%)	78
8.35	Result of analytical stability parameters of <i>trikantakadi kwath ghana</i> and <i>trikantakadi kwath ghana</i> with excipient (After 15 days at 40°C ± 2°C/ 75%RH ± 5%)	79
8.36	Result of analytical stability parameters of <i>trikantakadi kwath ghana</i> and <i>trikantakadi kwath ghana</i> with excipient (After 20 days at 40°C ± 2°C/ 75%RH ± 5%)	79
8.37	Result of analytical stability parameters of <i>trikantakadi kwath ghana</i> and <i>trikantakadi kwath ghana</i> with excipient (After 30 days at 40°C ± 2°C/ 75%RH ± 5%)	79
8.38	Result of analytical stability parameters of <i>trikantakadi kwath ghana vati</i> (After 15, 20 and 30 days at 40°C ± 2°C/ 75%RH ± 5%)	80
8.39	Organoleptic characters of <i>trikantakadi kwath</i> syrup (after 6 months of stability time period), <i>trikantakadi</i> tincture (after 6 months of stability time period), <i>trikantakadi kwath ghana vati</i> (after 30 days of stability time period)	81
8.40	TLC profiling of the <i>trikantakadi kwath</i> syrup (after 6 months of stability time period), <i>trikantakadi</i> tincture (after 6 months of stability time period), <i>trikantakadi kwath ghana vati</i> (after 30 days of stability time period).	82
8.41	Depicting phytochemical investigation of the prepared dosage forms (after the completion of stability time period)	83
8.42	Wavelength and calibration curve data of <i>trikantakadi kwath</i>	84
8.42a	Calibration curve data of <i>trikantakadi kwath</i>	84
8.43	Dissolution % drug release data of <i>trikantakadi kwath ghana vati</i> (III batch) at 261 nm	84

8.43a	Dissolution % drug release data of <i>trikantakadi kwath ghana vati</i> (III batch)	84
8.44	Comparison of dissolution % drug release data of <i>trikantakadi kwath ghana vati</i> (IV batch at 40°C ± 2°C/ 75%RH ± 5%) during stability with the previous dissolution % drug release at 261nm	85-86
8.44a	Comparison of dissolution % drug release data of <i>trikantakadi kwath ghana vati</i> (IV batch)	85-86
8.45	Sugar estimation plot of <i>trikantakadi kwath</i> syrup	86
8.45a	Sugar estimation data of <i>trikantakadi kwath</i> syrup	86
8.46	<i>In vitro</i> microscopic studies of formulations	87

List of figure

Fig. No.	Topic	Page No.
3.1	Schematic diagram of urinary stone formation	27
8.1	Morphological characters of <i>gokshura</i> fruits	53
8.2	Measurement of <i>gokshura</i> fruits	53
8.3	Powder microscopy of <i>gokshura</i> fruit	53
8.4	Powder microscopy of <i>gokshura</i> fruit	53
8.5	Powder microscopy of <i>gokshura</i> fruits	53
8.6	Powder microscopy of <i>gokshura</i> fruits	54
8.7	Powder microscopy of <i>gokshura</i> fruits	54
8.8	Morphological characters of fruit pulp of <i>amalaas</i>	54
8.9	Measurement of sample (<i>amaltaas</i>)	54
8.10	Morphological characters of root of <i>durbha</i>	55
8.11	Measurement of <i>durbha</i> sample	55
8.12	Powder microscopy of <i>durbha</i> roots	56
8.13	Powder microscopy of <i>durbha</i> roots	56
8.14	Powder microscopy of <i>durbha</i> roots	56
8.15	Powder microscopy of <i>durbha</i> roots	56
8.16	Powder microscopy of <i>durbha</i> roots	56
8.17	Transverse section of root of <i>durbha</i>	56
8.18	Transverse section of root of <i>durbha</i>	56
8.19	Morphological characters of <i>javasha</i>	57
8.20	Measurement of <i>javasha</i> sample	57
8.21	Powder microscopy of <i>javasha</i>	57
8.22	Powder microscopy of <i>javasha</i>	57
8.23	Powder microscopy of <i>javasha</i>	57
8.24	Powder microscopy of <i>javasha</i>	57
8.25	Transverse section of <i>javasha</i> (stem part)	58
8.26	Morphological characters of roots of <i>pashanabheda</i>	58
8.27	Measurement of root sample of <i>pashanabheda</i>	58
8.28	Powder characteristics of <i>pashanabheda</i>	59
8.29	Powder characteristics of <i>pashanabheda</i>	59

8.30	Powder characteristics of <i>pashanabheda</i>	59
8.31	Powder characteristics of <i>pashanabheda</i>	59
8.32	Transverse section of roots of <i>pashanabheda</i>	59
8.33	Transverse section of roots of <i>pashanabheda</i>	59
8.34	Transverse section of roots of <i>pashanabheda</i>	59
8.35	Transverse section of roots of <i>pashanabheda</i>	59
8.36	Morphological characters of <i>harar</i> fruits	60
8.37	Measurement of sample of <i>harar</i> fruits	60
8.38	Powder microscopy of <i>harar</i> fruits	61
8.39	Powder microscopy of <i>harar</i> fruits	61
8.40	Powder microscopy of <i>harar</i> fruits	61
8.41	Powder microscopy of <i>harar</i> fruits	61
8.42	Powder microscopy of <i>harar</i> fruits	61
8.43	Powder microscopy of <i>harar</i> fruits	61
8.44	Transverse section of fruit of <i>harar</i>	61
8.45	Transverse section of fruit of <i>harar</i>	61
8.46	Morphological characters of <i>pitpapda</i>	62
8.47	Powder microscopy of <i>pitpapda</i>	62
8.48	Powder microscopy of <i>pitpapda</i>	62
8.59	Powder microscopy of <i>pitpapda</i>	62
8.50	Transverse section of <i>pitpapda</i>	62
8.51	Morphological characters of root of <i>kaasmoola</i>	63
8.52	Measurement of root sample of <i>kaasmoola</i>	63
8.53	Powder microscopy of <i>kaasmoola</i>	64
8.54	Powder microscopy of <i>kaasmoola</i>	64
8.55	Powder microscopy of <i>kaasmoola</i>	64
8.56	Powder microscopy of <i>kaasmoola</i>	64
8.57	Powder microscopy of <i>kaasmoola</i>	64
8.58	Transverse section of roots of <i>kaas</i>	64
8.59	Transverse section of roots of <i>kaas</i>	64
8.60	Organoleptic characters of <i>trikantakadi kwath</i>	67
8.61	Organoleptic characters of <i>trikantakadi kwath</i> syrup	67

8.62	Organoleptic characters of <i>trikantakadi</i> tincture	68
8.63	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	68
8.64	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	68
8.65	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	68
8.66	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	68
8.67	TLC of <i>trikantakadi kwath</i>	72
8.68	TLC of <i>trikantakadi kwath ghana vati</i>	72
8.69	TLC of <i>trikantakadi kwath</i> syrup	72
8.70	TLC of <i>trikantakadi</i> tincture	72
8.71	Organoleptic characters of <i>trikantakadi kwath</i> syrup	81
8.72	Organoleptic characters of <i>trikantakadi</i> tincture	81
8.73	Organoleptic characters of <i>trikantakadi kwath ghana vati</i>	81
8.74	TLC profiling of the <i>trikantakadi kwath</i> syrup (after 6 months)	82
8.75	TLC profiling of the <i>trikantakadi</i> tincture (after 6 months)	82
8.76	TLC profiling of the <i>trikantakadi kwath ghana vati</i> (after 30 days).	82
8.77	Wavelength of <i>trikantakadi kwath</i>	84
8.78	Calibration curve of <i>trikantakadi kwath</i>	84
8.79	Dissolution % drug release graph of <i>trikantakadi kwath ghana vati</i> (III batch)	84
8.80	% cumulative drug release data of <i>trikantakadi kwath ghana vati</i> (IV batch)	85
8.81	Sugar estimation graph of <i>trikantakadi kwath</i> syrup	86
8.82	Crystal growth in artificial urine preparation	87
8.83	Crystal inhibition in 100 µl prepared drug sample of TK	87

8.84	Crystal inhibition in 1000 µl prepared drug sample of TK	87
8.85	Crystal inhibition in 100 µl prepared drug sample of TKGV	87
8.86	Crystal inhibition in 1000 µl prepared drug sample of TKGV	87
8.87	Crystal inhibition in 100 µl prepared drug sample of TKS	87
8.88	Crystal inhibition in 1000 µl prepared drug sample of TKS	87
8.89	Crystal inhibition in 100 µl prepared drug sample of TT	87
8.90	Crystal inhibition in 1000 µl prepared drug sample of TT	87

List of Graph

8.1	Showing % inhibition of TK with respect to time	88
8.2	Showing % inhibition of TKG _V with respect to time	89
8.3	Showing % inhibition of TKS with respect to time	89
8.4	Showing % inhibition of TT with respect to time	90

Abbreviation

WHO	World Health Organization
&	And
Lab.	Laboratory
Su.	Sutra
Sth.	Sthana
Chi.	Chikitsa
g	Gram
Lt.	Liter
i.e.	That is
e.g.	Example
SOP	Standard Operating Procedure
Ref. no.	Reference number
F.M.	Foreign matter
W.S.E.	Water soluble extractive value
A.S.E.	Alcohol soluble extractive value
L.O.D.	Loss on drying
T.A.	Total Ash
A.I.A.	Acid Insoluble Ash
R _f	Retardation factor
Mg	Milligram
ml	Millilitre
Cp	Centipoise
HCL	Hydrochloric acid
TSC	Total Solid content
TK	<i>Trikantakadi Kwath</i>
TKS	<i>Trikantakadi Kwath Syrup</i>
TT	<i>Trikantakadi tincture</i>
TKGV	<i>Trikantakadi Kwath ghana Vati</i>
TKGC	<i>Trikantakadi Kwath ghana churna</i>
TKGCE	<i>Trikantakadi Kwath ghana churna with excipient</i>

µl	Micro litre
-	Absent
+	Present
API	The Ayurvedic Pharmacopoeia of India
S.No.	Serial number
w/w	Weight/ weight
w/v	Weight/ volume
P	Page number
Vol.	Volume
⁰ C	Degree celsius
AFI	The Ayurvedic formulary of India
TLC	Thin Layer Chromatography
C.No.	Chapter Number
T. No.	Table Number
MCCPH102	Microcrystalline cellulose
Con.	Concentrated
%	Percentage
hr.	Hours

1. INTRODUCTION

CHAPTER 1

INTRODUCTION

Ayurveda is one of the world's most seasoned therapeutic frameworks. It started in India and has developed there over a huge number of years¹. The word “*Ayurveda*” is made out of two *Sanskrit* terms, “*Ayus*” means life and “*Veda*” means the knowledge and taken together it implies the, “study of life” or “the study of drug” or “Intelligence of life”, *Ayush* implies the conjunction of body, psyche, organs, sense, and self is known by the equivalent words *dhari*, *jivita*, *nityaga* and *anubandha*. *Ayurveda* is that arrangements with great, terrible, glad and despondent life, means good, bad, happy, and unhappy life respectively. The target of *Ayurveda* is to secure the strength of sound individuals and to lighten issue in the ailing person². *Ayurveda* is a medicinal science as well as it is a study of life. It is additionally called holistic science as every one of the parts of life, mind, body, soul and sense organs. Birth place of *Ayurveda* as an oral convention is taken to be 6000 BC. The term *Vedic* period, applies to that period at *Aryan* human advancement during which the four *Vedas* were created. They are: - *Rig Veda*, *Sam Veda*, *Yajur Veda*, *Atharva Veda*. Learning of *Vedic* drug is chiefly gotten from two *Vedas* the *Rig Veda* and the *Atharva Veda*³.

Ayurveda deals with the traditional medicine, is getting worldwide at present by ideals of its subjective quality, crucial components of wellbeing and imperative intimations for steady working of life. *Ayurveda* is fundamentally more arranged toward the administration of life issue which are in conspicuousness because of push related wonders and some different reasons among particular age group in the society⁴.

Urolithiasis formed in the urinary tract are the hard calcified masses it also affect the lower urinary tract.⁵ These stone causes the blood in urine and severe pain in the abdomen due to decreased urine volume.⁶ Kidney stone issue is rising day by days, particular in ladies with expending age. Protease inhibitors, antibiotics increase the danger of kidney stone. Managing the eating routine and use of medicines and supplement maintain the prevention of kidney stone formation.⁷ Kidney stones develop due to the presence of substances in urine like oxalate, phosphorous and calcium became highly concentrated.⁸ Kidney stones are of different types such as calcium stones, uric acid stones, struvite stones and cystine stones.⁹ In allopathic system of medicines adopted different procedure to treat the kidney stone such as: - medication, surgery, Shock Wave Lithotripsy (SWL), Ureteroscopy (URS), Percutaneous Nephrolithotomy

INTRODUCTION

(PCNL).¹⁰ According to *Acharya Sushruta* before the surgery took the medicated *ghrita*, alkali preparation, oil having the property of splitting, cutting and breaking of stone.¹¹ *Trikantakadi kwath* used for the treatment of urinary disorder, such as *mutrakricha*, *mutraashmari*.¹² The demerits of *kwath* are stability, shelf life, non- convenient, large dosages administration, to overcome the problem with the *kwath* an effort is made for the modification in the formulation without changing its efficacy and convert it into various dosages form such as tablet, syrup, and tincture.

Syrup: A syrup is a sweet, viscous, monophasic dosage forms, nearly saturated or concentrated solution of sucrose (66.7% w/w) in purified water.¹³

Tincture: Tincture is the liquid dosage form. It is prepared by macerating the herbal drugs in a mixture of water and alcohol at room temperature over a prescribed period of time.¹⁴

Tablets: Tablets are the solid pharmaceutical dosage forms containing medicaments with or without suitable diluents and prepared by either molding or compression method.¹⁵

Standardization

Standardization implies confirmation of its identity and assurance of its quality and purity.¹⁶ At present because of progression in the substance learning of raw drugs different techniques like botanical, chemical, biological, spectroscopic method are utilized for evaluating active constituents present in raw drugs.¹⁷ Standardization of herbal formulation and preparation is the way toward prescribing a set of standards or intrinsic characteristics, constant parameters, qualitative and quantitative values that carry an assurance of quality, efficacy, safety and reproducibility.¹⁸

WHO guideline for quality standardization herbal formulation

- 1) Stability appraisal and shelf life.
- 2) Safety appraisal; documentation of wellbeing in experience or toxicological studies.
- 3) Assessment of viability/ efficacy by ethno medical information's and biological activity evaluations.
- 4) Quality control of raw herbal drugs, plant preparations, and completed products.¹⁹

Importance of Standardization

Standardization of *Ayurvedic* formulation is necessary with a specific end goal to evaluate the quality of medications, based upon the concentration of their active principles, physical, chemical, phytochemical standardization, and In- vitro, In- vivo parameters. The quality

INTRODUCTION

appraisal of herbal formulations is vital with a specific end goal to legitimize their worthiness in current arrangement of solution.²⁰

Hurdles in herbal drug standardization

- 1) Genetic changeability.
- 2) Variation in developing conditions.
- 3) Diversity in harvesting, collecting procedures and processing of concentrates.
- 4) Principle of multiple of chemical constituents in single herbal raw drugs.
- 5) The lack of data and information about active pharmacologic principles.
- 6) Controversial character of different plant references.
- 7) Deliberated adulteration of plant material and in crude drugs.
- 8) Problems in transportation and storage.²¹

2. TERMINOLOGY

CHAPTER 2
TERMINOLOGY

Ayurveda: The traditional *hindu* system of medicine (treated as *upaveda* of *rigveda* and *atharva veda*), it is regarded as ancient science of life and is based on principle of maintaining the health of a healthy person or relieving the patient from the diseased conditions.

Veda: The most sacred scriptures of *hinduism* are the *Vedas*. The word *Veda* is derived from the root word, “*vid*” meaning to know. Thus, *Veda* means knowledge.

Bhaisajya: The substance that which conquer the disease or bring back the vitiated *doshas* to their normal level or that which counter acts the diseased condition and form the body in healthy state is known as “*Bhaisajya*”.

Kalpana: Is the process through which a substance is prepared into medicinal form by using some raw material according to decision of physician, various stages of disease and tolerance of patients.

Dosage form: By which drug molecules are delivered to sites of action within the body is called as dosage form.

Kwath: A *kwath* (decoction) is aqueous solution which contains the properties of any substances that have been boiled in it. The yield, colour and taste can vary from batch to batch.

Syrup: Sweet liquid made by dissolving sugar in water.

Tincture: A medicine made by dissolving an active pharmaceutical ingredients in alcohol or alcohol and water.

Tablets: Pharmaceutical tablets is a compressed solid unit dosage form of medicament containing a drug or a mixture of drugs with or without pharmaceutical excipients.

Standardization: The word “**Standardization**” implies the application of suitable methods and processes by which optimum conditions are ensured for obtaining predictable results and product which conform to certain set of standards in quality, purity, stability, safety and shelf life etc.

Mutrakricha (Urolithiasis): The process of formation of stones in the kidney, bladder and urinary tract.

Stability: Ability of a substance to remain unchanged over time under stated or reasonably expected conditions of storage and use.

In vitro: A biological process performed or taking place in a test tube, culture dish or elsewhere outside a living organism.

3. LITERATURE REVIEW

CHAPTER 3
LITERATURE REVIEW

3. Kwath churna

Herbal drugs or blend of drugs are made into coarse powder (*yavkuta*) and kept for preparation of *kashya* such type of powder are called *kwath churna*.²²

3.1 Kwath

Kwath is an *Ayurvedic* dosage form that is utilized to give the therapeutic effect to the body. In modern it is known as decoction or aqueous extract. *Kasaya* or *kwath* is the filtered fluid acquired by boiling coarse powder of medications in extent of 4, 8 or 16 (*mridu dravya*- 4, *madhyama dravya*- 8 and *kaithina dravya*-16 respectively) times of water and removed to one-fourth.²³

Preparation

First the *dravya* is pulverized coarsely (*yavakuta*). Legitimate amount of water is added to it and afterward boiled over mild fire and diminished to half or one fourth according to requirement.²⁴

Proportion of water [Table 3.1].^{25, 26}

1. 1 *masha* to 1 *pala* of drug- 16 times of water.
2. 1 *pala*- 1 *kudava* of drug- 8times.
3. 1 *kudava*- 1 *prastha* of drug- 4 times.
4. 1 *prastha*- 1 *khari* of drug- 4 times.

Table 3.1: Depicting the quantity of water used and reduction of water upto quantity

Reference	Nature of drug/ Quantity of drug	Quantity of water	Reduction upto
<i>Acharya Susruta</i>	-	8- 16 times	1/4 th
<i>Acharya Vagbhata</i>	-	8 times	1/4 th
<i>Acharya Indu</i>	-	16 times	1/4 th
<i>Acharya Ksharapani</i>	<i>Mridu, kathina,</i> <i>kathinati kathina</i>	4-8-16 times	1/4 th
<i>Acharya Sharangadhara</i>	-	16 times	1/8 th
<i>Acharya Sharangadhara</i>	<i>Madhyama</i>	8 times	1/4 th
<i>Acharya Varaha mihira</i>	1 <i>masha</i> - 1 <i>pala</i>	16 times	1/4 th
	1 <i>pala</i> - 1 <i>kudava</i>	8 times	1/4 th

LITERATURE REVIEW

	1 kudava- 1 prastha	4 times	1/4 th
	1 prastha- 1 khari	4 times	1/4 th
General rule	Unspecified	8 times	1/4 th

3.1.1 Charka Samhita: Mentioned the *kwath* under the *panchvidhkashaya kalpana*. Boil 1 *pala* (4 *tola*) *dravya* with 16 times of water over the fire in *mritika patra* till 1/8th part remains by method for this the *kwath* is prepared.²⁷

3.1.2 Sushruta Samhita: Precisely accurately weighted and dried bark, leaf, fruit, root are cutted into little pieces (make a *yavakuta* powder). Also, included eight or sixteenth times of water, boiled in wide mouth pot, ought to be decreased to 1/4th part by boiling. This is known as *kashya kalpana*.²⁸

3.1.3 Asthanga Samghra: *Sutrasthana*, 178/103 mentioned the *kwath* of different drugs like (*Aegle marmelos*, *Cajanus carjam*, *Hordeum vulgare*, *Stereospermum suaveolens*, *Piper nigrum*, *Gmelina arborea*, *Salmalia malabarica*) for detoxification purposes.²⁹

3.1.4 Sharangdhara Samhita: Mentioned about the preparation of *kwath*. Take 1 *pala* (4 *tola*) *yavakuta churna* of drugs, add 16 time water into it and heat it in the moderate fire till 1/8th parts remain then filter it and utilized as a part of minimal hot condition. Also mentioned the synonyms of *kwath* are *shrita*, *kashya* and *nirhuya*, *kwath* administration methods, time of administration of *kwath*.

The *prakshpa dravya*, *jira*, *guggulu*, *kshara*, *lavana*, *shilajitu*, *hing*, and *trikatu* utilized as a part of 1-1 *shana* (4-4 *Aana*). Drain *ghee*, *guda*, *taila*, *gomutra* and *drava dravya* like *nimbu swarasa* (lemon juice), *kalka* (paste), powder used in the quantity of -1 *karsa*. During the time of *kwath* the vessels is not closed with the closer because they take more time to process and badly digested.

For flavouring agent: Essence containing or volatile *dravya* are used in the form of *prakshepa dravya* and flavouring agent, else they lost their essence.³⁰

3.1.5 Yoga tarangini: Take coarse powder of herbal drugs and heated with 26 times water. Warmed over flame till 8 times remains. Also mentioned the synonyms: *shrita*, *kwath*, *kashaya*, and *niryuha*.³¹

3.1.6 Vridhasavarishtasamghra: Where the amount of *guda* and *prakshpa dravya* are not mentioned, their take 1 *drona* of *drava dravya* (water and decoction/ *kwath*). In two *drona kwath dravya* take the 1 *tula* fermented drugs (*sandhana dravya*) eg: *dhaaye pushpa*, *guda* is taken 1/2 of the quantity of *kwath dravya* and honey (*madhu*) is taken 1/4 of the *guda*.³²

LITERATURE REVIEW

3.1.7 Ayurved Sar Samghra: Boiling 1 *tola* of *yavakuta dravya* in *mritika patra* under moderate heat and reduced to 1/4th by boiling. Additionally also mentioned the *kwath* are prepared in *mritika patra* and *kwath* are used as a vehicles of different drugs administration.³³

3.1.8 Yogratnakara:- Coarse powder of the drugs (4 *tola*) boiled with (64 *tola*) water over *mriduagni* till 8 *tolla* remain.³⁴ Also mentioned the doses of *kwath* , time of administration, and said that *kwath* should be taken as the dose of two *pala* after the digestion of *aahara* (food).³⁵

3.1.9 Harita Samhita:- Mentioned the *kwath* along with its seven types, such as *deepan*, *pachan*, *sodhana*, *samana*, *kaledana*, *soshana*, *tarpana*.³⁶

3.2 Pravahi kwath

Pravahi kwath implies preserved decoction is most *Ayurved* importantly presented in *Ayurveda Sarsamgraha*. It is *Ayurvedic* hydroalcoholic preparation implied particularly for the *kwath*.

3.2.1 Objective of Pravahi kwath

Shelf life of *kwath* is short to conquer the issue of the shelf life the concept of *Pravahi kwath* came to presence. By making the *pravahi kwath* the formulation turned out to be stronger for the remedial reason.

3.2.2 Method of preparation of Pravahi kwath

Ayurveda Sar Samgraha: Mentioned the method of preparation of *pravahi kwath* by using:

1. Alcohol or rectified spirit
2. Fermented techniques

Method is same as the technique for planning of *asava* and *arishta*. After the preparation of *kwath guda*, *madhu*, *dhataki pushpa*, *babool bark*, and *madhuka pushpa* are included into the *kwath* from this strategy self- created liquor/ alcohol is produced called *pravahi kwath*.

3.2.3 Significance of Pravahi kwath

1. *Pravahi kwath* is the preserved decoction it improve the time span of usability of the *kwath* and keep the *kwath* away for degradation.
2. Doses of *pravahi kwath* is decreased as contrast with the dosage of *kwath*.
3. Bioavailability and remedial impact of the *pravahi kwath* is upgrade since alcohol and *madhya* have great entrance ability.³⁷

Some review on article

3.2.4 Ashok Kumar Tiwari, et al. (2016) Mentioned the standardization, quality control parameter and methodology of *Darvyadi pravahi kwath*. They also mentioned the 16 times of water for the preparation of *kwath*, and reduced to 1/8th, further concentrate it to 1/4th and added approved preservatives.³⁸

3.2.5 Deepti CP, et al. (2015) Mentioned the concentrated *kwath* to increased its palatability and stability.³⁹

3.2.6 Manish Vayas, et al. (2010) mentioned the preparation of decoction, preparation of concentrated and fermented decoction. Also mentioned the physiochemical parameters of decoction and fermented decoction.⁴⁰

3.3 *Trikantakadi kwath* [Table 3.2]:

3.3.1 *Rasatantrasara Va Sidhaprayoga Samgraha*⁴¹: Mentioned the ingredients of *trikantakadi kwath* along with its therapeutic use.

3.3.2 *Ayurveda Sara Samgraha*⁴²: Mentioned the ingredients of *trikantakadi kwath churna* along with the quantity and it's used in *ashmari*, *mutrakricha*, *mutraghat* and treatment of kidney stone and remove the stone outside the body.

Table 3.2: Depicting the ingredients of *trikantakadi kwath*

Name of drugs	<i>Rasatantrasara Va Sidhaprayoga Samgraha</i>	<i>Ayurveda Sar Samgraha</i>	Quantity
<i>Gokshura</i>	+	+	1 Part
<i>Amaltaas ka gudha (pulp)</i>	+	+	1 Part
<i>Darbhmoola</i>	+	+	1 Part
<i>Damasha/ javasha</i>	+	+	1 Part
<i>Pashan bheda</i>	+	+	1 Part
<i>Harar</i>	+	+	1 Part
<i>Kaasmool</i>	+	+	1 Part
<i>Pitpapda</i>	-	+	1 Part

3.4 Individual plant

3.4.1 *Gokshura*:

3.4.1.1 *Dravyaguna vijnana*⁻:

Mentioned the *gokshura* as a *vataashmari bhedana* and *mutrakricha*.⁴³

3.4.1.2 Shankar Nighantu:-

Mentioned the synonyms, *guna* and description of *gokshura*.⁴⁴

3.4.1.3 Rasaratna Samuchchaya:-

Mentioned the use of *gokshura* in the *mutrakricha*.⁴⁵

3.4.1.4 Priyanighantuh:-

Mentioned the synonyms of *gokshura*.⁴⁶

3.4.1.5 Raj Nighantu:-

Mentioned the synonyms of *gokshura*.⁴⁷

3.4.1.6 Controversial drugs in Indian medicine:-

Mentioned the botanical name, family and different varieties of *gokshura*.⁴⁸

3.4.1.7 The Ayurvedic Pharmacopoeia of India⁴⁹:-

Gokshura consists of ripe, dried, whole fruit of *Tribulus terrestris* Linn. Family- *Zygophyllaceae*. *Gokshura* is a rarely perennial, annual common weed. Found in dry, hot and sandy regions, grows as a prostrate herb throughout *India* and in *Kashmir* (Upto 3,000 m).

Synonyms

Sanskrit : *Svadamstra, Goksuraka, Traikantaka, Trikatna*

Assamese : *Gokhurkata, Gokshura*

Bengali : *Gokhri, Gokshura*

English : *Caltrops fruit*

Gujrati : *Bethagokharu, Mithagokhru, Nanagokharu*

Hindi : *Gokhru*

Kannada : *Neggilamullu, Neggilu, Sannaneggilu*

Kashmiri : *Pakhda, Michikand*

Malayalam : *Nerinjil*

Marathi : *Gokharu, Sarate*

Oriya : *Gokhyura, Gukhura*

Punjabi : *Bhakhra, Gokhru*

Tamil : *Nerinjil, Nerunjil*

Telugu : *Palleru Kaya*

Urdu : *Khar- e- Khasak Khurd*

Description

a) Macroscopic

Fruits:- light/ greenish yellow, stalked, five ribbed, covered with shift stiff or pubescent hairs, having five sets of short stiff spines, downward pointed around 0.5 cm in length, tips of spines practically meet in sets entire together forming pentagonal system around fruit. Dry ripe fruit isolates into five section, of every cocci and each shows up as single- fruit, every coccus is semi- lunar or plano- curved in structure containing at least four seeds, taste is somewhat astringent.

b) Microscopic

In transverse section of each coccus of gokshura fruit shows small epidermal cells, unicellular trichomes, in mesocarp contain 6-10 layers of parenchymatous cells, rosette types calcium oxalate crystals, in mesocarp contain 3-4 layers of small cells having prismatic crystals.

Identity, purity and strength

Foreign matter	Not more than 1 percent,
Total Ash	Not more than 15 percent,
Acid- insoluble ash	Not more than 2 percent,
Alcohol- soluble extractive	Not less than 6 percent,
Water- soluble extractive	Not less than 10 percent,

Constituents:- Potassium nitrate, gitogenin and hecogenins, sterols, sapogenin with diosgenin (pyroketone ring).

Properties and action

Rasa : *Madhura*

Guna : *Guru, Snigdha*

Virya : *Sita*

Vipaka : *Madhura*

Karma : *Brmhana, Asmarihara, Vastisodhana, Vrsya*

Formulations:- *Goksuradi Guggulu, Draksadi Cruna, Traikanaka Ghrta.*

Therapeutic uses:- *Asmari, Prameha, Sularoga, Arsa, Svasa, Kasa, Mutrakrcchra.*

Dose:- 3-6 g drug in power form, 20- 30 drug for decoction.

3.4.2 Kaas

3.4.2.1 Dravyaguna vijnana:-

Mentioned the *kaas* as a *mutravirachaniya, mutrakricha* and *ashmari*.⁵⁰

3.4.2.2 Raj Nighantu:-

Mentioned the synonyms and *guna* of *kaas*.⁵¹

3.4.2.3 Dhanvantri Nighantu:-

Mentioned the botanical name, family, *gunakarma* and synonyms of *kaas*.⁵²

3.4.2.4 The Ayurvedic Pharmacopoeia of India⁵³:-

Kasa consists of root stock attached with stem portion of *Saccharum spontaneum*, Family *Poaceae*. It is a perennial grass having slender culms, found in all India mostly in warmed parts upto 1,800 m in the *Himalaya*.

Synonyms

<i>Sanskrit</i>	: <i>Kasa, Svetacamara</i>
<i>Assamese</i>	: ----
<i>Bengali</i>	: <i>Chhote- kase, Kash, Keshe</i>
<i>English</i>	: Thatch- Grass
<i>Gujrati</i>	: <i>Kansado, Kansa, Kansado, Ghans</i>
<i>Hindi</i>	: <i>Kans, Kasa</i>
<i>Kannada</i>	: <i>Kirayikagachchha, Kasalu</i>
<i>Kashmiri</i>	: --
<i>Malayalam</i>	: <i>Nannana, Kusa, Kuruvikarimpu</i>
<i>Marathi</i>	: <i>Kasai</i>
<i>Oriya</i>	: --
<i>Punjabi</i>	: <i>Kani</i>
<i>Tamil</i>	: <i>Nanal, Nanalu, Karumbu, Kasa, Amaver</i>
<i>Telugu</i>	: <i>Kakicheraku, Relu</i>
<i>Urdu</i>	: <i>Kansa, Kasa</i>

Description

a) Macroscopic

Kaas occurs in the form of root stock attached with stem portions containing brown colour roots, yellowish- brown to brown, Cylindrical, 2- 25 cm length and 0.2- 1 cm thick, splintery, fracture.

b) Microscopic

In root stock having single layerd epidermis, consisting of slightly oval, thinwalled cells, pointed, elongated, from epidermis arise long unicellular long; cortex composed of 2-3 layered, elongated, thick- walled, palisade- like cells and 3-4 layers of thin- walled , oval to polygonal

LITERATURE REVIEW

parenchymatous cells; endodermis having thin-walled, single layered cells, lignified, thick-walled, polygonal, continuous ring of sclerenchymatous cells; pericycle single layered, consisting of very small, thin-walled cells beneath endodermis; ground tissues wide, composed of thin-walled, oval to polygonal, elongated parenchymatous cells having numerous, round to oval starch grains measuring 8- 24 μ in dia., scattered 'U' shaped vascular bundle in this region.

Powder – Powder shows fragments of thin-walled, tabular, rectangular, epidermal cells, Parenchymatous cells is oval to polygonal, sclerenchymatous cells are thick-walled polygonal, pointed unicellular hairs, vessels with reticulate thickening, small round to oval starch grains, measuring 8-24 μ in dia.

Identity, Purity and Strength

Foreign matter	Not more than	2 percent,
Total Ash	Not more than	7 percent,
Acid insoluble ash	Not more than	4 percent,
Alcohol- soluble extractive	Not more than	3 percent,
Water- soluble extractive	Not more than	4 percent,

T.L.C

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n- Butanol: Acetic acid: Water (4:1:5) shows under U.V. (366nm) one fluorescent zone at Rf. 0.83 (green). On exposure to Iodine vapour three spots appear at Rf. 0.30, 0.83 and 0.90 (all yellow). On spraying with 5% Methanolic- Sulphuric acid reagent and heating the plate for ten minutes at 105^o C six spots appear at Rf. 0.13, 0.23, 0.30, 0.69, 0.83, and 0.90.

Properties and action

Rasa - *Madhura tikta*

Guna - *Sara*

Virya - *Sita*

Vipaka - *Madhura*

Karma - *Pittahara, Vrisya*

Chemical constituent- Starch, polyphenolic compound, tannin

Important formulation- *Sukumara ghrita, Trikantaka ghrita, Mutravirecaniya kasaya curna, Asmarihara curna, Asmarihar kasaya curna.*

Therapeutic uses – *Raktapitta, Mutrakrccha, Asmari, Daha, Raktadosa, Sosa, Ksaya.*

Dose – 3-6 g of the drug in powder form.

3.4.3 Amaltaash/ Aragvadha

3.4.3.1 Dravyaguna vijnan:-

Mentioned the *amaltaash* as a *mutrakricha*, and to nourish the *mutramargha*.⁵⁴

3.4.3.2 Shankar Nighantu:-

Mentioned the synonyms, *guna* and description of *amaltaash*.⁵⁵

3.4.3.3 Priyanighantuh:-

Mentioned the introduction of *amaltaash*.⁵⁶

3.4.3.4 Dhanvantri Nighantu:-

Mentioned the botanical name, family, synonyms and *guna karma* of *amaltaash*.⁵⁷

3.4.3.5 Abhinava Buti Darpana:-

Mentioned the synonyms and description of *amaltaash*.⁵⁸

3.4.3.6 The Ayurvedic Pharmacopoeia of India⁵⁹:-

Aragvadha consists of stem bark of *Cassia fistula* Linn. (Fam. *Fabaceae*), a medium sized deciduous tree, 6 to 9 m tall with bright yellow flowers in long pendulous racemes, and long cylindrical blackish-brown pods of 25 to 50 cm in length and upto 3 cm in width; found wild and also commonly planted as ornamental tree in most parts of the country up to an altitude of 1200 m.⁵³

Synonyms

<i>Sanskrita</i>	: <i>Krtamala, Smpaka, Samyaka</i>
<i>Assames</i>	: --
<i>Bengali</i>	: <i>Sondaalee, Sonaalu</i>
<i>English</i>	: Indian Laburnum, Pudding pipe tree
<i>Gujrati</i>	: <i>Garmaalo</i>
<i>Hindi</i>	: <i>Amaltaas, Girimaal</i>
<i>Kannada</i>	: <i>Kakke, Kakkemar</i>
<i>Kashmiri</i>	: --
<i>Malayalam</i>	: <i>Konna</i>
<i>Marathi</i>	: <i>Baahvaa</i>
<i>Oriya</i>	: <i>Sunaari</i>
<i>Tamil</i>	: <i>Konnai</i>
<i>Telugu</i>	: <i>Rela</i>
<i>Urdu</i>	: <i>Amaltaas</i>

Description

a) Macroscopic

Dug occur in flat or curved thick pieces; outer surface smooth to rough with warty patches; greenish- grey to red; inner surface rough, reddish with parallel striations; fracture, laminate; odour, sweet and characteristic; taste, astringent.

b) Microscopic

Stem bark shows 5 to 8 layers of cork, composed of square to rectangular cells; cortex many layered, outer consisting of rectangular cells, middle tangentially elongated cells and inner of polygonal cells; groups of stone cells, oval to elongated arranged tangentially forming a continuous or discontinuous band; fibres present in groups in rest of the cortex; phloem shows sieve elements, phloem parenchyma and bast fibres in patches, traversed by uni to triseriate medullary rays of radially elongated oval cells; Phloem parenchyma of rectangular to polygonal thin walled cells; bast fibres moderately thick walled, lignified, in groups surrounded by crystal fibres; abundant isolated calcium oxalate prism crystals present also in cells of outer cortex and inner cortex; starch grains mostly simple, but a few with 2 or 3 components in phloem parenchyma.

Powder- Powder characteristics shows thin walled parenchymatous cells; numerous bundles of lignified fibres associated with crystal fibres; sieve tubes, many, well- developed; numerous stone cells, thick walled, lumen nearly absent; abundant prismatic crystals of calcium oxalate mostly present singly in a cell and also as numerous crystal fibres; starch grains mostly simple, 2 or 3 in compound grains, hilum in conspicuous.

Identity, purity and strength

Foreign matter	Not more than 2	percent,
Total Ash	Not more than 6	percent,
Acid- insoluble ash	Not more than 1	percent,
Alcohol- soluble extractive	Not less than 15	percent,
Water- soluble extractive	Not less than 46	percent,

Constituents:- Sugar, pectin, anthraquinone, mucilage.

Properties and action

<i>Rasa</i>	: <i>Madhura, Tikta</i>
<i>Guna</i>	: <i>Guru</i>
<i>Virya</i>	: <i>usna</i>
<i>Vipaka</i>	: <i>Madhura</i>

Karma : *Recana*

T.L.C:-

T.L.C. of the diethyl ether extract on precoated silica gel 'G' plate (0.2 mm thick) using petroleum ether: ethyl acetate : formic acid (15:2:5:0.2) showed spots at Rf 0.19, 0.28, 0.54 and 0.72 (all pink) on spraying with vanillin- sulphuric acid reagent and heated the plate at 105°C for about ten minutes.

Formulations:- *Aragvadhadi kwath curna.*

Therapeutic uses:- *Sula, Gulma, Vibandha, Udavarta, Hrdroga, Prameha.*

Dose: - 5-10 g of powder drug

3.4.4 Durbha

3.4.4.1 Dravyaguna vijnana:-

Mentioned *durbha* for the treatment of *mutrakricha*.⁶⁰

3.4.4.2 Shankar Nighantu:-

Mentioned the synonyms, *guna* and description of *durbha*.⁶¹

3.4.4.3 Priyanighantuh:-

Mentioned the little introduction of *durbha*.⁶²

3.4.4.4 Raj Nighantu:-

Mentioned the *seetadurbha* and *haridgarbhadurbha*.⁶³

3.4.4.5 The Ayurvedic Pharmacopoeia of India⁶⁴:-

Druva consists of dried whole plant of *Cynodon dactylon* Linn. (Fam. Poaceae), an elegant, tenacious, perennial, creeping grass growing throughout the country and ascending to 2440 m.

Synonyms

Sanskrit : *Satavirya*

Assamese : --

Bengali : *Durva*

English : *Creeping Cynodon, Couch grass*

Gujrati : *Khadodhro, Lilidhro, Dhro*

Hindi : *Doob*

Kannada : *Garike Hullu*

Kashmiri : --

Malayalam : *Koruka Pullu*

Marathi : *Doorva, Harlee*

Oriya : --

Punjabi : *Dubada*
Tamil : *Aruvam Pullu*
Telugu : *Garika, Pacchgaddi*
Urdu : *Doob Ghas, Doob*

Description

a) Macroscopic-

Fibrous, cylindrical, upto 4 mm thick, minute hair- like roots arise from the main roots; cream coloured. Stem- Slender, prostrate, upto 1.0 mm thick, jointed, leafy, very smooth, yellowish green in colour. Leaf- 2 to 10 cm long and 1.25 to 3 mm wide, narrowly linear or lanceolate, finely acute more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots and at the base of the stems; sheath light, glabrous or sometimes bearded, ligule a very fine ciliate rim.

b) Microscopic

Root- Mature root shows epiblema or piliferous layer composed of a single layer of thin-walled, radially elongated to irregular shaped cells; cortex differentiatous and 4 to 6 layers, 1 or 2 layers of smaller, elongated parenchymatous cells; endodermis quite distinct, single layered, thick- walled, tangentially elongated cells; pericycle 1 or 2 layers composed of thin-walled sclerenchymatous cell; vascular bundles consisting of xylem and phloem, arranged in pith, composed of oval to rounded thick- walled parenchymatous cells containing numerous simple, round to oval or angular starch grains measuring 4 to 16 μ in dia., and compound starch grains having 2 to 4 components.

Powder- Cream coloured; fragments of xylem vessels with pitted walls, thick- walled lignified sclerenchymatous cells and numerous simple round to oval or angular starch grains, and compound starch grains having 2- 4 components.

Identity, purity and strength

Foreign matter	Not more than 2 percent,
Total Ash	Not more than 7 percent,
Acid- insoluble ash	Not more than 3 percent,
Alcohol- soluble extractive	Not less than 1 percent,
Water- soluble extractive	Not less than 5 percent,

Constituents:- Phenolic Phytotoxins and Flavonoids.

Properties and action

Rasa : *Madhura, Tikta, Kasaya*

LITERATURE REVIEW

Guna : *Laghu*

Virya : *Sita*

Vipaka : *Madhura*

Karma : *Kaphapittasamaka, Raktapittanasaka, Dahaghna, Sramahara, Trptikara, Atisaraghna.*

T.L.C.:-

T.L.C. of the alcoholic extract on Silica gel 'G' plate using n- Butanol : Acetic acid : Water (4:1:5) shows under UV (366nm) three fluorescent zones at Rf 0.70, 0.89 (both blue) and 0.92 (pink). On exposure to Iodine vapour six spots appear at Rf 0.22, 0.30, 0.37, 0.80, and 0.92 (all yellow) On spraying with 5% Methanolic- Sulphuric acid reagent and heating the plate at 105°C for ten minutes six spots appears at Rf 0.22, 0.30, 0.37, 0.80, 0.89, 0.92 (all grey).

Formulations:- *Balasvagandha laksadi taila, Manasa mitra vataka, Marma gutika, Madhuyastyadi taila.*

Therapeutic uses:- *Raktapitta, Trsnaroga, Daharoga, Visarpa, Tvakaroga, Tvakaroga, Arocaka, Duhsvapna, Bhutaroga, Raktapitta, Chardi, Murccha, Raktapradara, Mutra daha.*

Dose:- 5-10 ml *svarasa.*

3.4.5 Javasha

3.4.5.1 Dravyaguna vijnana:-

Mentioned *javasha* for the treatment of *mutrakricha*.⁶⁵

3.4.5.2 The Ayurvedic Pharmacopoeia of India⁶⁶:-

Javasha consists of dried whole plant of *Alhagi pseudalhagi* (Bieb). Desv. Family- *Fabaceae*. *Javasha* is a small thorny shrub, mostly found in dry and arid regions of *Punjab, Gujarat, Utter Pradesh and Rajasthan.*

Synonyms

Sanskrit : *Yavasa, Yasa, Yavasaka*

Assamese : *Bhatuashak*

Bengali : ---

English : *Persian manna plant*

Gujrati : *Javaso*

Hindi : *Javasa*

Kannada : *Turuchana gida, Javasa, Neladangara, Ballidurabi, Duralabha*

Kashmiri : ---

Malayalam : *Venkatithura, Valiya Kotithuva*

LITERATURE REVIEW

<i>Marathi</i>	:	<i>Dhamasa</i>
<i>Oriya</i>	:	--
<i>Punjabi</i>	:	--
<i>Tamil</i>	:	<i>Punaikanjuri, Kanchori</i>
<i>Telugu</i>	:	<i>Chinnadoolagondi, Dhanvayasamu</i>
<i>Urdu</i>	:	<i>Turanjabeen</i>

Description

a) Macroscopic

Root- Well developed, 20- 30 cm long and 0.2- 1 cm thick; gradually tapering, secondary and tertiary root absent; dark brown; fracture, short.

b) Microscopic

Stem- Cylindrical, glabrous, slightly rough at basal region with slender; hard, sharp axillary spines upto spines upto 3.8 cm long; branched, terete, striate, glabrous, nearly 0.1- 1 cm thick; yellowish- green to yellowish- brown.

Leaf- Simple, alternate, oblong, mucronate, obtuse, drooping, opposite, extipulate, 0.5- 1 cm long, 0.5- 0.7 cm broad. Elliptical, smooth or puberulous with very short petiole, stipules green; no taste and odour.

Root- Shows 6- 10 layers of tangentially elongated, radially arranged cork cells; cork cambium single layered, filled with reddish- brown contents; secondary cortex almost absent; phloem composed of sieve elements, phloem parenchyma and phloem fibres; some phloem parenchyma cells filled with tannin; xylem consists of vessels, tracheids, fibres parenchyma and xylem rays; vessels mostly solitary with simple pits; tracheids and fibres thick- walled, ascptate with bluntly pointed ends; medullary rays 1- 4 cells wide, 3- 45 cells long; pith composed of a few thin- walled, angular, parenchymatous cells; starch grains simple, rounded to oval, 5.5- 14.75 μ in dia. Present throughout the region.

Stem- Shows a single layered epidermis covered externally with thick cuticle; cortex composed of 8- 15 layers of oval, tangentially elongated cells, numerous taninniferous cells found scattered in this region; pericycle present in form of fibre groups; phloem composed of sieve elements, parenchyma and fibres; some parenchyma cells filled with tannin; xylem consists of vessels, tracheids, xylem fibres, xylem parenchyma cells filled with tannin; xylem consists of vessels, tracheids, xylem fibers, xylem parenchyma and xylem rays; vessels solitary or in groups of 2- 3 with simple pits; tracheids and fibres, a few with thick wall and simple pits;

LITERATURE REVIEW

medullary rays 2- 3 cells wide pith wide pith composed of rounded, thin- walled, parenchymatous cells, some cells filled with tannin.

Leaf- Appears circular in outline; shows single layered epidermis covered externally with cuticle; hypodermis 2- 3 layered, filled with tannin, ‘D’ shaped collateral vascular bundle present in central region; rest of tissue between vascular bundle and hypodermis composed of thin- walled, parenchymatous cells some of which are filled with tannin.

Midrib- Appears biconvex in outline; epidermis single layered, covered externally with thick cuticle; hypodermis 1- 2 layered, filled with tannin; pericycle present in the form of fibres strands; vascular bundle collateral; xylem situated above phloem, rest of tissue between vascular bundle and pericyclic strand is parenchymatous.

Lamina- Epidermis consisting layered cells, covered with cuticle; paracytic stomata present on both surfaces hypodermis single layered filled with tannin; mesophyll not differentiated into palisade and spongy parenchyma, consisting of thin- walled oval to polygonal cells having chlorophyll; rounded to elongated tanniferous cells found scattered in mesophyll.

Powder- Greenish- brown; shows fragments of epidermal cells consisting of rectangular to polygonal, elongated, thin- walled, parenchymatous cells with paracytic stomata, pitted vessels, fibres, tanniferous cells, simple, round and oval starch grains measuring 5.5- 14.75µ in diameter.

Identity, purity and strength

Foreign matter	Not more than 2	percent,
Total Ash	Not more than 13.5	percent,
Acid- insoluble ash	Not more than 2.5	percent,
Alcohol- soluble extractive	Not less than 2	percent,
Water- soluble extractive	Not less than 10	percent,

Constituents- Sugars (Melizitose, Sucrose, Invert Sugars).

Properties and action

<i>Rasa</i>	:	<i>Madhura, Tikta, Kasaya</i>
<i>Guna</i>	:	<i>Laghu, Sara</i>
<i>Virya</i>	:	<i>Sita</i>
<i>Vipaka</i>	:	<i>Madhura</i>
<i>Karma</i>	:	<i>Balakrt, Dipana, Kaphahara, Pittahara</i>

Important formulations- *Chinnodbhavadi kwathurna, Arimedadi taila.*

Therapeutic uses- *Chardi, jvara, Kasa, Raktapitta, Trsna, Vatarakta, Visarpa.*

Dose- 20- 50 gm of the drug in powder form for decoction.

3.4.6 Pitapapda

3.4.6.1 Dravyaguna vijnana:-

Mentioned the *pitapapda* for the treatment of *mutrakricha*.⁶⁷

3.4.6.2 Shankar Nighantu:-

Mentioned the synonyms, guna and description of *pitapapda*.⁶⁸

3.4.6.3 Raj Nighantu:-

Mentioned the synonyms and *guna* of *pitapapda*.⁶⁹

3.4.6.4 Dhanvantri Nighantu:-

Mentioned the botanical name, family, synonyms and *guna karma* of *pitapapda*.⁷⁰

3.4.6.5 The Ayurvedic Pharmacopoeia of India⁷¹:-

Parpata consists of dried whole plant of *Fumaria parviflora* Lam. (Fam. *Fumaraceae*), a pale green, branched, annual, diffuse herb, about 60 cm high, distributed as a weed of cultivated fields over the greater parts of the country, and also commonly growing on road sides during cold season.

Synonyms

<i>Sanskrit</i>	: <i>Varatika, Suksmapatra</i>
<i>Assamese</i>	: <i>Shahtaraj</i>
<i>Bengali</i>	: <i>Vanshulpha, Bansulpha</i>
<i>English</i>	: <i>Pittapapda, Pitpapado, Pittapapado</i>
<i>Hindi</i>	: <i>Pittapapada, Dhamgajra, Pittapapara</i>
<i>Kannada</i>	: <i>Kallu Sabbasige, Parpatu</i>
<i>Kashmiri</i>	: --
<i>Malayalam</i>	: --
<i>Marathi</i>	: <i>Pittapapada, Shatara, Parpat</i>
<i>Oriya</i>	: --
<i>Punjabi</i>	: <i>Shahtara, Pittapara</i>
<i>Tamil</i>	: <i>Tura, Tusa</i>
<i>Telugu</i>	: <i>Parpatakamu</i>
<i>Urdu</i>	: <i>Parpata</i>

Description

a) Macroscopic

Root- Buff or cream coloured, branched, about 3 mm thick, cylindrical; taste, bitter. Stem-

LITERATURE REVIEW

Light green, smooth, diffused, hollow, about 2 to 4 mm thick; taste, bitter and slightly acid. Leaf- Compound, pinnatifid, 5 to 7 cm long, divided into narrow segments; segments 5 mm long and about 1 mm broad, linear or oblong, more or less glaucous, acute or subacute; petiole, very thin, 2.5 to 4.0 cm long; taste, bitter. Flower- Racemes with 10 to 15 flowers, peduncle upto 3 mm, pedicels about 0.5 mm long, triangular ovate, acuminate; corolla in 2 whorls with very small 4 petals, each about 4 mm long; inner petals with a purple or green tip; outer petal with narrow spur, without purple spots stamens 3+3, staminal sheath subulate above, about 4 mm long, stigma 2 lipped. Fruit- Capsule, 2 mm long and slightly broader, subrotund, obtuse or subtruncate, obscurely apiculate, rugose when dry; nutlets globose, upto 2 mm long, single seeded.

b) Microscopic

Root- Root shows single layered of epidermis, 5 or 6 layers cortex consisting of thin-walled, rectangular, parenchymatous cells, outer 1 or 2 layers irregular and brown in colour; endodermis not distinct; secondary phloem very consisting of 2 or 3 rows with usual elements; central core shows a wide zone of xylem and consists of usual elements; central core shows a wide zone of xylem and consists of usual elements; vessels mostly solitary having reticulate and spiral thickening, medullary ray less developed and mostly solitary having reticulate and spiral thickening, medullary ray less developed and mostly uniseriate; fibres moderately long, thick-walled, having narrow lumen and blunt tips. Stem- Stem shows a pentagonal outline, having prominent angles composed of collenchymatous cells; epidermis single layered of thin-walled, oblong, rectangular cells, covered with thin cuticle; cortex narrow, composed of 2 to 4 layers of chlorenchymatous cells endodermis not distinct; vascular bundles collateral, 5 or 6 arranged in a ring; each vascular bundle capped by a group of sclerenchymatous cells; phloem consists of usual element; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels much elongated, having reticulate, annular or spiral thickening or simple pits; xylem fibers narrow elongated with pointed ends having a few simple pits; centre hollow or occupied by narrow pith consisting of thin walled, parenchymatous cells.

Powder- Light greenish- brown; shows fragments of parenchyma; tracheids, fibres, and vessels having simple pits and spiral thickening; anomocytic stomata and wavy walled epidermal cells in surface view.

Identity, purity and strength

Foreign matter	Not more than 2 percent,
Total Ash	Not more than 30 percent,

Acid- insoluble ash Not more than 10 percent,

Alcohol- soluble extractive Not less than 7 percent,

Water- soluble extractive Not less than 29 percent,

Constituents:- Alkaloids, Tannins, Salt and sugars of potassium.

Properties and action

Rasa : *Tikta*

Guna : *Laghu*

Virya : *Sita*

Vipaka : *Katu*

Karma : *Rocaka, Raktadosahara, Pittahara, Kaphahara, Samgrahi.*

Formulations: - *Pacanamrta kwath curna, Tiktaka ghrta, Mahatiktaka ghrta, Brhata garbha, Cintamani rasa.*

Therapeutic uses: - *Bhrama, Chardi, Daha, Jvara, Raktapitta, Raktavikara, Trsa, Mada, Glani.*

Dose: - 1-3 gm.

3.4.7 Pashana bheda

3.4.7.1 Dravyaguna vijnana:-

Mentioned *pashana bheda* as in *asmarighan, mutrakricha and ashmaribhedana*.⁷²

3.4.7.2 Shankar Nighantu:-

Mentioned the synonyms, *guna* and description of *pashana bheda*.⁷³

3.4.7.3 Priyanighantuh:-

Mentioned the little introduction, its habitate in *Himalaya Pradesh* and its effect on *mutraashmari*.⁷⁴

3.4.7.4 Raj Nighantu:-

Mentioned the synonyms, *guna* of *pashana bheda*, its activity in *mutrakricha* and *ashamaribhedan*.⁷⁵

3.4.7.5 Controversial drugs in Indian medicine:-

Mentioned the different controversial plant of *pashana bheda*.⁷⁶

3.4.7.6 Abhinava Buti Darpana:-

Mentioned the synonyms, and use of *pashana bheda*.⁷⁷

3.4.7.7 The Ayurvedic Pharmacopoeia of India⁷⁸:-

Pasanabheda consists of rhizomes of *Bergenia ciliate*, Syn.*Bergenia ligulata* (Haw.) Sternb. (Fam. *Saxifragaceae*), a small perennial herb found throughout temperate *Himalayas* from

LITERATURE REVIEW

Bhutan to Kashmir at an altitude between 2000-3000 m and in *Khasia* hills upto 1200 m altitude.

Synonyms

<i>Sanskrit</i>	:	<i>Asmabhedaka, Silabheda</i>
<i>Assamese</i>	:	<i>Patharkuchi</i>
<i>Bengali</i>	:	<i>Patharkuchi, Himasagara, Patrankur</i>
<i>English</i>	:	--
<i>Gujrati</i>	:	<i>Pashanbheda, Pakhanbheda</i>
<i>Hindi</i>	:	<i>Pakhanabheda, Silphara</i>
<i>Kannada</i>	:	<i>Alepgaya, Hittaga</i>
<i>Kashmiri</i>	:	<i>Pashanbheda</i>
<i>Malayalam</i>	:	<i>Kallurvanchi, Kallorvanchi</i>
<i>Marathi</i>	:	<i>Pashanbheda</i>
<i>Oriya</i>	:	<i>Pasanbhedi</i>
<i>Punjabi</i>	:	<i>Kachalu</i>
<i>Tamil</i>	:	<i>Sirupilai</i>
<i>Telugu</i>	:	<i>Kondapindi</i>
<i>Urdu</i>	:	--

Description

a) Macroscopic-

Rhizome, solid, barrel shaped, cylindrical, 1.5- 3 cm in diameter with small roots, ridges, furrows and root scars distinct, transversely cut surface shows outer ring of brown coloured cork, short middle cortex, vascular bundles and large central pith, odour, aromatic, taste, astringent.

b) Microscopic-

Transverse section of rhizome shows cork divided into two zones, outer a few layers of slightly compressed and brown coloured cells, inner zone multi-layered consisting of thin-walled tangentially elongated and colourless cells, followed by a single layered cork cambium and 2-3 layers of secondary cortex composed of thick-walled, tangentially elongated, rectangular cells with intercellular cortex composed of thick-walled, tangentially elongated, rectangular cells with intercellular spaces, some cells contain rosette crystals of calcium oxalate and simple starch grains cortex a narrow-zone of parenchymatous cells containing a number of simple starch grains, most of cortical cells also contain large rosette crystals of calcium oxalate,

LITERATURE REVIEW

endoderm and pericyclic absent. Vascular bundles, arranged in a ring, collateral, conjoint and open, phloem tissues composed of sieve elements and parenchyma, in outer region found as compressed masses while in inner region intact. A number of rosette crystals of calcium oxalate also found as crystal fibres, cambium present as continuous ring composed of 2- 3 layers of thinwalled, tangentially elongated cells, xylem consist of fibres, tracheids, vessels and parenchymatous cells, varying in size and containing starch grains with crystals of calcium oxalate similar to those found in cortical region.

Identity, purity and strength

Foreign matter	Not more than 2	percent,
Total Ash	Not more than 13	percent,
Acid- insoluble ash	Not more than 0.5	percent,
Alcohol- soluble extractive	Not less than 9	percent,
Water- soluble extractive	Not less than 15	percent,

Constituents: - Tannic acid, glucose, gallic acid.

Properties and action

Rasa : Tikta, Kasaya

Guna : Laghu

Virya : Sita

Vipaka : Katu

Karma : Bhedana, Vastisodhana, Asmarighna, Mutravirecaniya.

Formulations:- *Asmarihara kasaya curna, Mutravirecaniya kasaya curna.*

Therapeutic uses:- *Asmari, Meha, Mutrakicchra*

Dose:- 3-6 g of powder drug

20- 30 g of drug for decoction.

3.4.8 Harar

3.4.8.1 Dravyaguna vijnana:-

Mentioned *harar* in *mutrakricha* and *ashmari roga*.⁷⁹

3.4.8.2 Raj Nighantu:-

Mentioned the synonyms of *harar*.⁸⁰

3.4.8.3 Dhanvantri Nighantu:-

Mentioned the botanical name, family, synonyms and *guna karma* of *harar*.⁸¹

3.4.8.4 The Ayurvedic Pharmacopoeia of India⁸²:-

Haritaki consists of pericarp of mature, dry fruits of *Terminalia chebula* Retz. (Family- Combretaceae) moderate or large sized, flowers comes in April, August and fruits ripen in October- January, plant found throughout *India* in deciduous forests and in area of rainfall.

Synonyms

Sanskrit : *Abhaya, Kayastha, Ajya, Siva, Pathya, Vijaya (Not bhanga)*

Assamese : *Shilikha*

Bengali : *Haritaki*

English : *Myrobalan*

Gujrati : *Hirido, Pulo- harad*

Hindi : *Harre, Harad, Harar*

Kannada : *Alalekai*

Kashmiri : *Halela*

Malayalam : *Katukka*

Marathi : *Hirda, Harda*

Oriya : *Harida*

Punjabi : *Halela*

Tamil : *Kadukkai*

Telugu : *Karaka, karakkay*

Description

a) Macroscopy

Naturally it is yellowish- brown, 20-35 cm long and astringent taste, 13- 25 mm wide, ovoid, ribbed longitudinally and wrinkled, fibrous pericarp are 3-4 mm thick and non- adherent to seed.

b) Microscopy

Transverse section of pericarp shows: Epicarp having one layer of epidermal cells , mesocarp shows 2-3 layers of collenchyma, parenchyma in which sclereids and fibers in group and scattered vascular bundles, fibers with outgrowth and simple pitted walls, sclereids of different shapes and sizes but abundantly elongated, tannin and raphide also present in parenchyma. Endocarp: Have thick walls of different sizes and shape generally elongated, epidermal surface: Shows uncovered polygonal cells having thickwalled, are divided into two by a thin septa. Starch grain: Simple rounded or oval having 2-7 μ in diameter, found in mesocarp.

Powder microscopy: Under microscope shows fibres, vessels of simple pits, and sclereids.

Identity, purity and strength

Foreign matter	Not more than 1 percent,
Total Ash	Not more than 5 percent,
Acid- insoluble ash	Not more than 5 percent,
Alcohol- soluble extractive	Not less than 40 percent,
Water- soluble extractive	Not less than 60 percent,

Constituents:- Tannins, Polyphenolic compounds, anthraquinones.

Properties and action

Rasa : Madhura, Amala, Katu, Tikta, Kasaya

Guna : Laghu, Ruksa.

Virya : usna

Vipaka : Madhura

Karma : Caksusya, Dipana, Hradya, Medhya, Sarvadosaprasamana, Rasayana, Anulomana.

Formulations:- *Triphala churna, Abhaya lavana, Brahma rasayana, Triphaladi taila.*

Therapeutic uses: *Sotha, Arsa, Kasa, Siroroga, Svasa, Gulma, Vibandha, Aruchi, Jirnajvara.*

Dose: 3-6 g of powder of drugs.

3.5 Kidney stone/ Mutra ashmari (urolithiasis)⁸³

Mutra ashmari means urinary calculus or kidney stone [Figure 3.1].

Symptoms

- 1) Pain during urination.
- 2) Pain in urethra and bladder.
- 3) Burning sensation during urination.
- 4) Urine output reduced.
- 5) Reddish- yellow coloured urine.
- 6) Headache and body ache.
- 7) Lethargy

3.5.1 The disease undergoes following consequences⁸⁴:

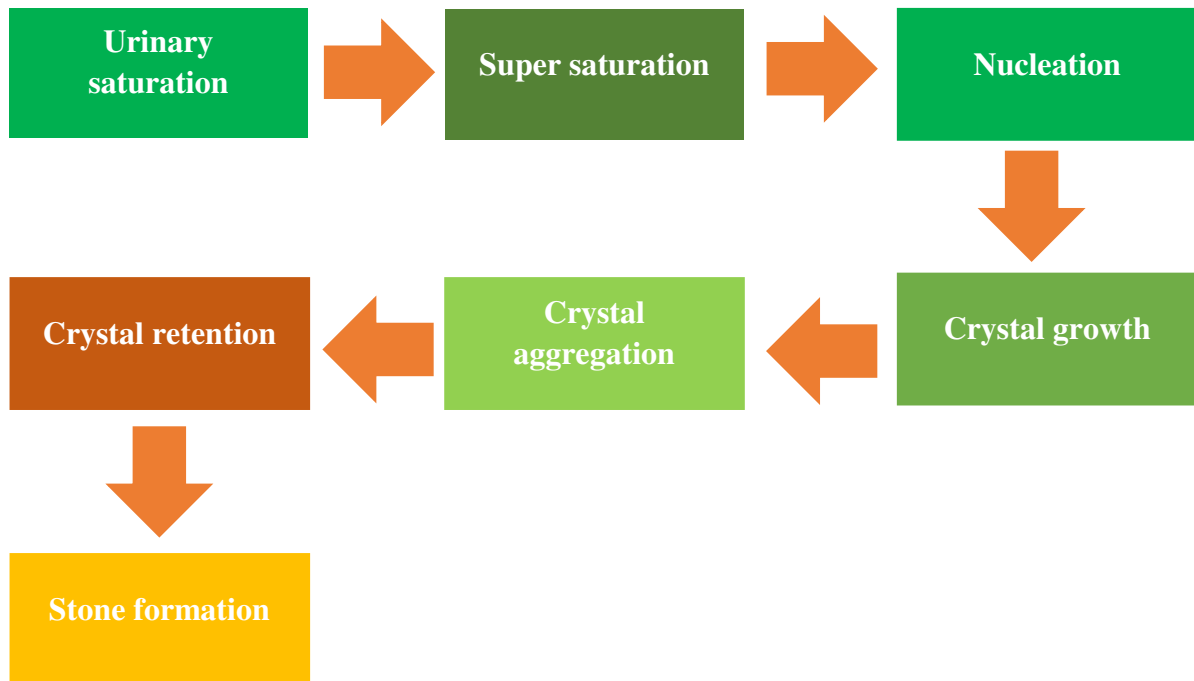


Figure 3.1 Schematic diagram of urinary stone formation

3.5.2 Charaka samhita:-

Mentioned the types of *asmari*, *vataj*, *pitaj*, *kafaj*, *raktaj asmari* and their symptoms.⁸⁵

3.5.3 Shushruta Samhita:-

Mentioned the types and *samprapti*⁸⁶

3.5.4 Sharangadhara Samhita:-

Mentioned about the *mutraghat*, *mutrakrich* and *ashmari*.⁸⁷

3.5.5 Madhavanidanam:-

Mentioned the four types of *asmari* and symptom of *vataj*, *pitaj*, *kafaj*, and *sukra asmari*.⁸⁸

3.5.6 Yogratnakar:-

Mentioned the *chikitsa*, *nidan*, *pathy*, *apathy* for the *ashmari roga*.⁸⁹

3.5.7 Rasa Ratna Samuchya:-

Mentioned the detail of *mutrakrichha rogas*, symptoms of *ashmari* and causes of *ashmari*.⁹⁰

3.5.8 Bhela Samhita:-

Mentioned about the *mutrakricha* and difficulty in *micturition*.⁹¹

3.5.9 Kasyap Samhita:-

Mentioned the treatment of dysuria.⁹²

3.5.10 Roga vijyan:-

Mentioned about the *mutraghata*, *vataj*, *pitaj*, *kafaj* and *sanipataj mutrakricha* and their symptoms.⁹³

3.6 Prepared formulations

3.6.1 Syrup⁹⁴: A syrup is a sweet, viscous, monophasic dosage forms, nearly saturated or concentrated solution of sucrose (66.7% w/w) in purified water. First references was dated 1664 and letter of 1684 enclosing some maple sugar from Canada, state.

Advantages of syrup

- Syrup prevent the growth of bacteria due to its high osmotic pressure.
- Syrup are palatable, so it is a very good vehicle for the administration of bitter and nauseous substances.
- It is partly hydrolysed into reducing sugars so it retard oxidation.

3.6.2 Tincture⁹⁵: Tincture is the liquid dosage form. It is prepared by macerating the herbal drugs in a mixture of water and alcohol at room temperature over a prescribed period of time.

Advantages of Tincture

- Remain potent for many years.
- Some herbal compounds only extracted with alcohol.
- Easy to carry and convenient to take because it is quite effective in smaller dose.
- The solvent (Alcohol) also act as a preservative and have antiurolithic activity.
- Some herbal compounds only extracted by alcohol.

3.6.3 Tablets: Tablets are the solid pharmaceutical dosage forms containing medicaments with or without suitable diluents and prepared by either molding or compression method.⁹⁶ Pills/ Tablets are traditional medicine around 1500 BC. The first references to tablets were found on Papyruses in ancient Egypt.⁹⁷

Advantages of Tablets⁹⁸

- Easy to be administered.
- Easy to be dispensed.
- More suitable dosage form.
- Economic dosage form.
- After coating to the tablets, bitter and nauseous substances can be given easily in tablet form.

4. RATIONALE AND SCOPE OF THE STUDY

RATIONALE AND SCOPE OF THE STUDY

CHAPTER 4

RATIONALE AND SCOPE OF THE STUDY

4.1 Rationale of study

Trikantakadi kwath is one of the classical formulation. The stability, shelf life, non- convenient, time consuming, large dosage administration of the *trikantakadi kwath* is an issue, thus to increase the shelf life and stability of *kwath* and overcome all the problem associate with *kwath* it's converted into the various dosages forms such as tablets, syrup, tincture. Evaluate the preliminary phytochemical and physicochemical changes, effect of accelerated temperature conditions on the phytochemical and physicochemical properties of TK and its various dosage form during the stability study. In this study attempt was made to develop the various dosage form of *trikantakadi kwath* which have antiurolithic properties and perform the *in vitro* comparative study of all the prepared dosage form.

4.2 Scope of the study

TK is one of the polyherbal preparation indicated for the treatment of *mutraashmari* and *mutrakricha*. By the implication of new techniques the TK may be developed into various dosage form, like: tablets, syrup and tincture. The development of polyherbal preparation into various dosage forms will solve the problems like shelf life, stability, non- convenient, time consuming, large dosage administration and may also enhance therapeutic compliances of *trikantakadi kwath*.

5. OBJECTIVE OF STUDY

CHAPTER 5

OBJECTIVE OF STUDY

5.1 Aim and objectives

- a) To explore the concept of various dosage form of *trikantakadi kwath* such as tablets/ *ghana vati*, syrup and tincture.
- b) To make the stable dosages form of *trikantakadi kwath*.
- c) To developed the SOP for the *trikantakadi kwath* & TKS, TT, TKGV.
- d) To carry out the standardization of the prepared dosage form.
- e) To carry out the stability and *in vitro* study of prepared dosage form of *trikantakadi kwath*.

6. MATERIAL AND RESEARCH METHODOLOGY

CHAPTER 6

MATERIAL AND RESEARCH METHODOLOGY

6.1 List of Equipment used:

Table 6.1: Depicting the table for the equipment used

S. NO.	Material
1.	Digital pH meter
2.	Digital balance
3.	Hot plate
4.	Water bath
5.	Hot air oven
6.	Muffle furnace
7.	UV spectrophotometer
8.	Humidity chamber
9.	Abbe's refractometer
10.	UV cabinet
11.	Disintegration apparatus
12.	Dissolution apparatus
13.	Roche Friabilator apparatus
14.	Monsanto hardness tester
15.	Compound microscope
16.	Electron microscope
18.	Mechanical stirrer

6.2 List of Chemical used:

Table 6.2: Depicting the table for the chemical used

Chemical				
Ferric chloride anhydrate	Glacial acetic acid	Potassium iodide	Ruthenium Red	Formic acid
Ethanol	Conc. Sulphuric acid	Bismuth sub- nitrate	Magnisium turning	Phenolphthalein
Iodine	Pyridine	Picric acid (Hager reagent)	Toluene	Sodium chloride

MATERIAL AND RESEARCH METHODOLOGY

Chloroform	Sodium nitropruside	α - naphthol	Ammonium chloride	Sodium phosphate
Ammonia solution	Acetone	Copper sulphate pentahydrate	Propylparabean	Sodium oxalate
Ethyl acetate	Potassium chloride	Potassium hydroxide	Methylparabean	Ammonium hydroxide
Lead acetate	Mercuric chloride	Hydrochloride	Citric acid	Dicalcium phosphate
Calcium chloride	Silica gel G	Sodium citrate	Gum acacia	Aerosil
Methanol	Anisaldehyde	Magnisium sulphate	MCCPH102	Sodium starch glycolate

6.3 List of herbal drug used

Name of drugs	Botanical Name and Family
<i>Gokshura</i>	<i>Tribulus terrestris</i> Linn. Zygophyllaceae
<i>Amaltaas ka gudha (pulp)</i>	<i>Cassia fistula</i> Linn. Fabaceae
<i>Darbhmoola</i>	<i>Cynodon dactylon</i> Linn. Poaceae
<i>Damasha/ javasha</i>	<i>Alhagi camelorum</i> (Bieb). Desv. Fabaceae
<i>Pashan bheda</i>	<i>Bergenia ciliata</i> (Haw.) Sternb. Saxifragaceae
<i>Harar</i>	<i>Terminalia chebula</i> Retz. Combretaceae
<i>Kaasmool</i>	<i>Saccharum spontaneum</i> Linn. Poaceae
<i>Pitpapda</i>	<i>Fumaria parviflora</i> Lam. Fumaraceae

6.4 Research methodology

1. Procurement of raw herbs from the appropriate source used in the preparation of various dosage form.
2. Authentication of raw herbal material.
3. To study the classical and recent literature review regarding to the *trikantakadi kwath*, its tablets, syrup, and tincture.
4. Pharmacognostic and phytochemical study of raw material.

MATERIAL AND RESEARCH METHODOLOGY

- a) Macroscopic and microscopic study
- b) Primary phytochemical study
- c) Physicochemical analysis of herbal material.
 - i. LOD at 110⁰C
 - ii. Total Ash at 450⁰C
 - iii. Acid Insoluble Ash
 - iv. Water soluble extractive value
 - v. Alcohol soluble extractive value
5. Preparation of different dosage form of *trikantakadi kwath*.
6. Evaluation of prepared formulations
 - a) Physicochemical analysis of formulations [Table 6.4]

Evaluation Parameters of Formulations				
TK	TKS	TT	TKGP	TKGV
Total ash(% w/w)	Total ash (% w/w)	Total ash (% w/w)	Bulk density	Shape and appearance
Acid Insoluble ash(% w/w)	Acid Insoluble ash (% w/w)	Acid Insoluble ash (% w/w)	Tapped density	Hardness
Total solid content(% w/v)	pH meter	pH meter	Compressibility index	Thickness and diameter
pH meter	Total sugar content (%v/v)	Specific gravity at 25°C (g/ml)	Angle of repose	Friability
Specific gravity at 25°C (g/ml)	Viscosity (millipoise)	Wt/ ml (g)	-	Weight variation test
Viscosity (millipoise)	Wt/ml (g)	Viscosity (millipoise)	-	Assay
Wt/ml (g)	Specific gravity at 25°C (g/ml)	Total solid content (% w/v)	-	Dissolution test (% drugs release)

MATERIAL AND RESEARCH METHODOLOGY

Refractive index at room temperature	Total solid content (% w/v)	Test for methanol	-	Disintegrati on time (at 28-32 rpm)
-	Refractive index at room temperature	Reducing sugar (%v/v) titrimetric method	-	-
-	Total acidity (%v/v) titrimetric method	Non- reducing sugar (%v/v) titrimetric method	-	-
-	Reducing sugar (%v/v) titrimetric method	Total sugar (%v/v) titrimetric method	-	-
-	Non reducing sugar (%v/v) titrimetric method	Total acidity (%v/v) titrimetric method	-	-
-	-	Refractive index at room temperature	-	-
-	-	Alcohol content (% v/v)	-	-

b) Phytochemical analysis of formulations

c) Stability study

d) *In vitro* study of prepared formulations

i. Stability study for three days (TKS, TT)

ii. Stability study for 30 days (TKGV)

iii. Stability study for three months (TKS, TT)

7. Comparative study of prepared formulations.

8. Result and discussion.

9. Conclusion.

10. References.

7. EXPERIMENTAL WORK

CHAPTER 7

EXPERIMENTAL WORK

7.1 Collection of Ingredients

The raw herbs such as *Amaltaas ka guda*, *Haritaki*, *Javasa*, *Pitpapda*, *Pasanabheda*, *Gokshura*, *Kaasmoola* were purchased from the local market of Jalandhar. *Durvha* was collected from the herbal garden of Lovely Professional University, Phagwara.

7.2 Authentication of raw herbs

The authentication of herbs such as *Amaltaas*, *Javasa*, *Haritaki*, *Pitpapda*, *Pasanabheda*, *Gokshura*, *Kaasmoola*, *Durbha* is carried out by Dr. Satiwinderjeet Kaur, Head, Department of Botanical and Environmental Sciences, Guru Nanak Dev University Amritsar, Punjab with ref. no. 1088, date 18.10.16.

7.3 Pharmacognostic study [Table 8.1- 8.16] & [Figure 8.1- 8.59]

7.3.1 Macroscopic study

The organoleptic character are used for the determination of morphological characters. The organoleptic character included the colour, odour, size, taste, fracture etc.

7.3.1.1 Methodology

- Colour examination is done with the naked eye or magnified lense
- Ruler and caliper is used for the size determination.
- The odour can be determined by smell.
- The taste is determined by putting drug piece in the mouth.

7.3.2 Microscopic study

Microscopic examination is done with the help of microscope.

7.3.2.1 Methodology

Transverse section, longitudinal section and powder of raw herbal material are used to prepare a glass slide followed by covering with cover slip and examined the slide under the light microscope by using 10x and 45x lenses.

7.4 Pharmaceutical work

7.4.1 Aim: *Trikantakadi kwath* preparation according to classical text.

Date of start: 6/October/2016

Date of completion: 6/October/2016

Time of start: 10:00 AM

End time: 3:00 PM

7.4.1.1 Equipment required: Grinder, weighing balance, tray, sieve, steel vessels, spatula, measuring cylinder.

Material: Cloth, match box, gas stove, water.

EXPERIMENTAL WORK

7.4.1.2 Formula: Master formula used for the preparation of *trikantakadi kwath*⁹⁹ [Table 7.1]

Table 7.1: depicting the master formula of *trikantakadi kwath*

S.No.	Ingredients	Latin name	Part used	Quantity (g)
1.	<i>Gokshura</i>	<i>Tribulus terrestris</i>	Fruit	62.5
2.	<i>Amaltaas</i>	<i>Cassia fistula</i>	Fruit pulp	62.5
3.	<i>Darbhmoola</i>	<i>Cynodon dactylon</i>	Root	62.5
4.	<i>Javasha</i>	<i>Alhagi camelorum</i>	Whole part	62.5
5.	<i>Pashan bheda</i>	<i>Bergenia ciliata</i>	Root	62.5
6.	<i>Harar</i>	<i>Terminalia chebula</i>	Fruit	62.5
7.	<i>Pitpapda</i>	<i>Fumaria parviflora</i>	Whole plant	62.5
8.	<i>Kaasmoola</i>	<i>Saccharum spontaneum</i>	Root	62.5

7.4.1.3 Procedure: Grind the whole drugs separately in the grinding mill to make its coarse powder and suspending it overnight in water. Next morning heated over the mild fire to reduce one-fourth of its quantity.

7.4.1.4 Observation:

During process: Colour of *kwath*: Brown

Odour: Characteristics

Taste: *Tikta kashaya*

Touch of herbal drug: Soft or smooth

Quantity taken: 500g

Quantity obtained: 1000ml

7.4.2 Aim: *trikantakadi kwath* syrup preparation

Date of start: 6/October/2016

Date of completion: 6/October/2016

Time of start: 10:00 AM

End time: 4:00 PM

7.4.2.1 Equipment required: Grinder, weighing balance, steel vessels, tray, sieve, measuring cylinder, spatula, and amber colour glass bottle.

EXPERIMENTAL WORK

Material: Cloth, match box, gas stove, water

Chemical required: Citric acid, methylparabean, propylparabean

7.4.2.2 Formula: Master formula used for the preparation of *trikantakadi kwath syrup*¹⁰⁰

[Table 7.2]

Table 7.2: depicting the master formula of *trikantakadi kwath syrup*

S.No.	Ingredients	Latin name	Part used	Quantity (g)
1.	<i>Gokshura</i>	<i>Tribulus terrestris</i>	Fruit	62.5
2.	<i>Amaltaas</i>	<i>Cassia fistula</i>	Fruit pulp	62.5
3.	<i>Darbhmoola</i>	<i>Cynodon dactylon</i>	Root	62.5
4.	<i>Javasha</i>	<i>Alhagi camelorum</i>	Whole part	62.5
5.	<i>Pashan bheda</i>	<i>Bergenia ciliata</i>	Root	62.5
6.	<i>Harar</i>	<i>Terminalia chebula</i>	Fruit	62.5
7.	<i>Pitpapda</i>	<i>Fumaria parviflora</i>	Whole plant	62.5
8.	<i>Kaasmoola</i>	<i>Saccharum spontaneum</i>	Root	62.5

7.4.2.3 Procedure: Add 500g sugar candy powder in prepared *kwath* (TK). And adjusted to proper level (i.e. 1000ml) over the mild heat. Then add citric acid (0.1g), Propylparabean (2g), Methylparabean (2g) into it and store in amber coloured glass bottle at room temperature.

7.4.2.4 Observation:

During process: Colour of syrup: Brown

Odour: Characteristics

Taste: *Madhur, tikta*

Quantity taken: 500g

Quantity obtained: 1000ml

7.4.3 Aim: Trikantakadi tincture preparation according to British Pharmacopoeia.¹⁰¹

Date of start: 3/October/2016

Date of completion: 17/October/2016

Time of start: 11:00 AM

End time: 2:00 PM

EXPERIMENTAL WORK

7.4.3.1 Equipment required: Earthen pot, weighing balance, grinder, tray, sieve, spatula, and amber colour glass bottle

Material: cloth, water

Chemical required: Ethanol

7.4.3.2 Formula: Master formula used for preparation of *trikantakadi tincture* [Table 7.3]

Table 7.3: Depicting the master formula of *trikantakadi tincture*

S.No.	Ingredients	Latin name	Part used	Quantity (g)
1.	<i>Gokshura</i>	<i>Tribulus terrestris</i>	Fruit	25
2.	<i>Amaltaas</i>	<i>Cassia fistula</i>	Fruit pulp	25
3.	<i>Darbhmoola</i>	<i>Cynodon dactylon</i>	Root	25
4.	<i>Javasha</i>	<i>Alhagi camelorum</i>	Whole part	25
5.	<i>Pashan bheda</i>	<i>Bergenia ciliata</i>	Root	25
6.	<i>Harar</i>	<i>Terminalia chebula</i>	Fruit	25
7.	<i>Pitpapda</i>	<i>Fumaria parviflora</i>	Whole plant	25
8.	<i>Kaasmoola</i>	<i>Saccharum spontaneum</i>	Root	25

7.4.3.3 Procedure: In 200 g accurately weighted powdered drugs added 1000 ml of 15% solution of ethanol in distilled water. Macerated the drugs in air tight jar and placed jar at dark place for a time period of 14 days. After 14 days press the marc and after filtration store in amber colour glass bottle.

7.4.3.4 Observation:

During process: Colour of tincture: light brown

Odour: Alcoholic fragrance

Taste: *Kashya, tikta*

Quantity taken: 200g

Quantity obtained: 700ml

EXPERIMENTAL WORK

7.4.4 Aim: Trikantakadi kwath ghana vati (tablets) preparation.

Date of start: 11/January/2017

Date of completion: 20/January/2017

Time of start: 10:00 AM

End time: 5:00 PM

7.4.4.1 Equipment required: Grinder, weighing balance, steel vessels, tray, sieve, measuring cylinder, spatula, hot air oven, mortar and pestle, direct tablet compression machine

Material: butter paper,

Chemical required: MCCPH102, lactose, DCP (Dicalcium phosphate), aerosil, sodium starch glycolate, magnesium stearate, PVPK-30/25, gum acacia

7.4.4.2 Formula: Master formula used for preparation of trikantakadi kwath ghana vati^{100, 102} (Tablet). [Table 7.4]

Table 7.4: Depicting the master formula of *Trikantakadi kwath Ghana vati*

S.No.	Ingredients	Latin name	Part used	Quantity (g)	
				For ghana	For Fine powder
1.	<i>Gokshura</i>	<i>Tribulus terrestris</i>	Fruit	135	10
2.	<i>Amaltaas</i>	<i>Cassia fistula</i>	Fruit pulp	30	10
3.	<i>Darbhmoola</i>	<i>Cynodon dactylon</i>	Root	70	10
4.	<i>Javasha</i>	<i>Alhagi camelorum</i>	Whole part	180	10
5.	<i>Pashan bheda</i>	<i>Bergenia ciliata</i>	Root	135	10
6.	<i>Harar</i>	<i>Terminalia chebula</i>	Fruit	23	10
7.	<i>Pitpapda</i>	<i>Fumaria parviflora</i>	Whole plant	125	10
8.	<i>Kaasmoola</i>	<i>Saccharum spontaneum</i>	Root	165	10

EXPERIMENTAL WORK

Table 7.5: Depicting the composition and quantity of material used

S.No.	Composition	Quantity of materials used (mg)			
		Batch			
		I	II	III	IV
1.	Ghana powder	15,000	14,850	2,000	12,000
2.	Gum acacia	-	150	-	-
3.	MCCPH102	-	-	1000	12000
4.	Lactose	-	-	1000	-
5.	Dicalcium phosphate	-	-	250	1500
6.	Aerosil	-	-	250	1500
7.	Sodium starch glycolate	-	-	225	1350
8.	Magnesium stearate	-	-	225	1350
9.	PVPK- 30/25	-	-	500	3000
10.	Wt. of each tablet	500	500	550	550
11.	Number of compressed tablets	30	30	10	60

7.4.4.3 Procedure: Heated the *kwath* over the mild fire till the *kwath* get concentrated. Concentrated material placed in a hot air oven at 45⁰C for drying. After the completion of drying process add the equal quantity of fine powder of all the ingredients. After the addition of excipient, powder were compressed into tablet of 550 mg and store in the glass bottle.

7.4.4.4 Observation:

During the process of *kwath*: Colour of *kwath*: Brown

Odour: Characteristics

Taste: *Madhur, tikta*

During the process of tablets (IV batch)

Colour of Ghana powder with excipient: Creamish white

Odour: Characteristics

Taste: *Kashya*

Form: Solid

EXPERIMENTAL WORK

7.5 Analytical study [Table 8.1- 8.16 & Table 8.22-8.26]

7.5.1 Determination of Foreign matter¹⁰³

Weight 100-500 g sample (drugs) to be analysed or the quantity prescribed in the monograph, and spread the specimen in the form of thin layer. The foreign matter ought to be identified with the unaided eye or by the utilization of a lens (6X). Separate the foreign matter, weight it and compute the percentage.

$$\text{Percentage of Foreign matter} = \frac{\text{Initial weight- final weight}}{\text{Weight of sample}} \times 100$$

7.5.2 Determination of Total Ash¹⁰⁴

Incinerate around 2 to 3 g precisely weighed, of the ground drug in a tarred silica crucible at a temperature not exceeding 450⁰C until free from carbon, cool and weight, If carbon free ash can't acquired, boiling the charred mass with hot water, gather the deposit on ashless filter paper, and ignite again at a temperature not exceed 450⁰C. Compute the rate of ash remains with reference to the air- dried drugs.

$$\text{Percentage of Total Ash} = \frac{\text{Weight of ash}}{\text{Weight of sample}} \times 100$$

7.5.3 Determination of Acid insoluble ash¹⁰⁵

Boil the acquired ash for 5 minutes with 25 ml of dilute hydrochloric acid, filter with ash less filter paper washing is done with the hot water and then gather the insoluble matter in a crucible. Ignite to constant weight and then calculate the percentage.

$$\text{Percentage of Acid Insoluble Ash} = \frac{\text{Weight of acid insoluble ash}}{\text{Weight of sample}} \times 100$$

7.5.4 Determination of Moisture content (Loss on drying at 105⁰C)¹⁰⁶

Place around 5-10 g of the drugs in powder form in tarred evaporating dish. Dry it at 105⁰C for 5 hours in hot air oven and weighed after cooled in desiccator, again dry it until the difference between two progressive weighting compares to not more than 0.25 percent. The loss of weight was ascertained in mg/g of dried material.

EXPERIMENTAL WORK

$$\text{Percentage of Loss on drying} = \frac{\text{Initial weight- final weight}}{\text{Weight of sample}} \times 100$$

7.5.5 Determination of Alcohol Soluble Extractive¹⁰⁷

Macerate about 5 g of coarsely powdered drugs with 100 ml of alcohol in a closed flask for twenty- four hours, shaking frequently amid six hours and permitting standing for eighteen hours. Filter quickly taking precautions against loss of liquid, 25 ml of filtrate is evaporate to dryness in a tarred flat evaporating dish, and dry at 105⁰C to consistent weight and then weigh it. Calculate the percentages of alcohol- soluble extractive with reference to air- dried drugs.

$$\text{Percentage of Alcohol Soluble Extractive} = \frac{\text{Weight of residue} \times \text{volume made}}{\text{Weight of sample} \times \text{volume taken}} \times 100$$

7.5.6 Determination of Water Soluble Extractive¹⁰⁸

Proceed as coordinate for the determination of Alcohol soluble extractive, use water rather than ethanol.

$$\text{Percentage of Water Soluble Extractive} = \frac{\text{Weight of residue} \times \text{volume made}}{\text{Weight of sample} \times \text{volume taken}} \times 100$$

7.5.7 Determination of pH¹⁰⁹

The pH value of an aqueous fluid might be characterized as the logarithm of the reciprocal of hydrogen ion concentration expressed in g/liter. Before each measurement it is necessary to calibrated the pH meter, The calibration of pH meter should be done with two or three buffer solution with known pH mostly pH 4, pH 7 and pH 9.2 buffer solutions can be used. The pH estimation of a fluid can decide potentiometrically by method for the glass electrode, a reference electrode and pH meter.

7.5.8 Determination of Viscosity¹¹⁰

Viscosity is measured by using ostwald viscometer. Liquid flows from the capillary tube, and determined the time required for the liquid sample to pass between two marks in viscometer. The flow time of sample under test was compared with the time required for the reference liquid of known viscosity (Normal water utilized).

EXPERIMENTAL WORK

$$\frac{\eta_1 \rho_1 t_1}{\eta_2 \rho_2 t_2} = \frac{\eta_1 \rho_1 t_1}{\eta_2 \rho_2 t_2}$$

η_1 = Viscosity of the known liquid, η_2 = Viscosity of the unknown liquid, ρ_1 = Density of known liquid, ρ_2 = Density of unknown liquid, t_1 = time taken by the known liquid, t_2 = time taken by the unknown liquid.

7.5.9 Refractive Index¹¹¹

The refractive index of drugs with reference to air is the proportion of the sine of the angle of incidence to the sine of angle of refraction of a light emission going from air into the substance. It varies with the wavelength of the light utilized in its measurement.

$$\eta = \frac{\sin i}{\sin r}$$

$\sin i$ is angle of incidence and $\sin r$ is angle of refraction

7.5.10 Determination of Total Solid Content¹¹²

50 ml of accurately weighted sample transfer into an evaporable dish, evaporate the sample to dryness over the water bath, after this dried the evaporating dish with sample at 105⁰C for 3 hours. Cool and then placed the residue dish in a desiccator for 30 minute. After this weigh it immediately.

$$\text{Total Solid Content} = \frac{\text{Weight of residue}}{\text{Weigh/ vol. of sample}} \times 100$$

7.5.11 Alcohol content¹¹³

Transfer 25 ml of sample being inspected, precisely measured at 24.9⁰C to 25.1⁰C, to the distillation flask. Dilute it with 150 ml water and include a little pumice powder. After this attach the distillation head and condenser. Distil it and gather at least 90 ml of the distillate into a 100 ml volumetric flask. Conform the temperature to 24.9⁰C to 25.1⁰C and dilute to volume with distilled water at 24.9⁰C to 25.1⁰C and determine the relative density. The values obtained from ethanol content table. After computation of the ethanol content, report the outcome to one decimal place.

$$\text{Specific gravity} = \frac{W_3 - W_1}{W_2 - W_1}$$

EXPERIMENTAL WORK

W_1 = Weight of Empty specific gravity bottle, W_2 = Weight of specific gravity bottle with water, W_3 = Weight of specific gravity bottle with sample.

7.5.12 Test for methanol¹¹⁴

Iodoform test: Mix the sodium hydroxide and iodide in methanol. Yellow coloured precipitate of iodoform indicate the presence of methanol.

7.5.13 Appearance¹¹⁵

Organoleptic parameters of tablets like, free from cracks, pinholes, depression, color, surface roughness and polish of the tablets should be uniform on whole surface of tablets.

7.5.14 Dimensions (Diameter and thickness)

Thickness of the tablets are related to the porosity, weight and also with compression force. Vernier calipers or screw gauge are used to measure the dimensions of tablets.

7.5.15 Shape and size of the tablets

Suitable shape and size are required for good consumer acceptance. The shape and size of tablets is influenced by:

- Tablet weight.
- Density of granulating blend.
- Dosage form.

7.5.16 Weight Variation¹¹⁶

Weighted twenty tablets individually by utilizing digital weighing balance and determined there average weight. At that point singular tablet weight was compared with the average weight. On the off chance that normal weight of the tablets is more than the 324 mg then maximum percentage difference permitted is 5%.

$$\text{Weight variation} = \frac{\text{Average weight} - \text{individual weight}}{\text{Average weight}} \times 100$$

7.5.17 Hardness test:- Monsanto hardness tester¹¹⁷

Tablet is placed between the spindle and anvil of hardness tester. The appropriate pressure needed to hold tablet in position is applied by moving the screw knob in clockwise direction. Note the reading which indicates the pressure to be needed to break the tablets. Compressed tablets is considered best between 3-5 kg/ cm².

7.5.18 Friability¹¹⁸

Roche friabilator is used to test the friability of tablets. In friabilator apparatus tablets are fall at the height of 6'' in each revolution. Weigh the 10 tablets accurately and place in friabilator

EXPERIMENTAL WORK

and rotate at the speed of 25 rpm for about 4 min (100 revolutions) removed the tablets and dedusted. Weighed the tablet again and calculated the percentage loss during the revolutions.

$$\text{Percentage of Friability} = \frac{\text{Initial weight} - \text{final weight}}{\text{Weight of tablets}} \times 100$$

7.5.19 Disintegration test¹¹⁹

One tablet is placed in each of 6 tubes of the basket and operate the apparatus, utilizing water kept up at $37^{\circ}\text{C} \pm 2^{\circ}\text{C}$ as the immersion fluid unless generally determined in the individual monograph. Toward the end of as far as possible indicated in the monograph lift the basket from the fluid and observe the tablets, every one of the tablets having broken down totally. The disintegration time of uncoated tablets is considered 30 minutes.

7.5.20 Dissolution test¹²⁰ [Table 8.42]

Development of calibration curve: - 10 mg of TK powder was accurately weighted and transferred to the 100 ml of volumetric flask. Afterward volume of the flask was adjusted to 100 ml with distilled water to get a concentration of 1 mg/ml. Suitable aliquot was withdrawn from this stock solution in order to get a concentration of 50, 100, 200, 300, 400, 500 $\mu\text{g/ml}$. The dilution were used to draw the calibration curve with the help of UV Spectrophotometer. Procedure: - USP apparatus type II (paddle) at 50 rpm are used to perform the dissolution test of uncoated tablets. Maintained the temperature of 0.1N HCL solution at $37 \pm 0.5^{\circ}\text{C}$, after fixing the paddle place the tablet in the dissolution chamber, run the apparatus. 10 ml of sample is withdrawn at regular intervals of time from the dissolution chamber and replaced with 10 ml volume of 0.1 N HCL solution to maintain the sink condition dilute the sample, by using UV visible spectrophotometer measured the absorbance at maximum wavelength of same drugs.

$$\text{Percentage dissolution} = \frac{\text{Sample absorbance}}{\text{Stander absorbance}} \times \frac{\text{Stander dilution}}{\text{Sample dilution}} \times 100$$

7.5.21 Bulk density: ¹²¹It is the ratio of given mass of powder and its bulk volume. It is determined by transferring an accurately weighted amount of powder sample to the graduated cylinder with the aid of the funnel. The initial volume as noted. The ratio of weight of the volume is occupied was calculated.

$$\text{Bulk density} = \text{Weight/ volume (Untapped)}$$

7.5.22 Tapped density: This is calculated by transferring a known quantity (g) of powder into a graduated cylinder and tapping it for specific time of period. The initial volume was noted.

EXPERIMENTAL WORK

The graduated cylinder was tapped continuously for a period of 5-10 minutes. The density can be determined as the ratio of mass of powder to the tapped volume.

$$\text{Tapped volume} = W / V_t$$

W = Mass of powder

V_t = tapped volume

7.5.23 Compressibility index: It is the tendency of the powder to be compressed base on the apparent bulk density and tapped density. The percentage compressibility of the powder can be determined by using the formula.

$$\text{Percentage of compressibility} = \frac{\text{Tapped density} - \text{bulk density}}{\text{Tapped density}} \times 100$$

7.5.24 Angle of repose: The angle between the surface of the pile of the powder and the horizontal surface is known as the angle of repose. The powder is passing through funnel fixed to the burette at the height of 2.5cm. A graph paper is placed down the funnel on the table. The height and the radius of the pile were measured. Angle of repose of the powder was calculated by using this formula.

$$\text{Angle of repose } (\Theta) = \tan^{-1} (h/r)$$

h = height of pile

r = radius of pile

7.6 Quantitative estimation¹²²

7.6.1 Reducing and Non- reducing sugars

Determination of Non- reducing sugars = Amount of total sugars- content of reducing sugar.

Reagent preparation:-

Fehling's solution- A: - 69.278 gm of CuSO₄ dissolve in 1 liter of water.

Fehling's solution- B: - Dissolve 340 gm sodium potassium tartarate and 100 gm of sodium hydroxide in 1 liter of purified water.

Clarifying reagent:

Solution 1: 21.9 gm of zinc acetate and 3ml of glacial acetic acid dissolve in 100 ml of purified water.

Solution 2: 10.6 gm of potassium ferrocyanide dissolve in 100 ml of water.

EXPERIMENTAL WORK

7.6.1.1 Reducing sugars:

Suitable amount of sample is neutralize with (10% water solution of sodium hydroxide). Evaporate on 50°C on water bath to remove the alcohol until the half of volume till remain. Cool the solution and add 10 ml clarifying solution I, and equal volume of clarifying solution II. Mix, filter with filter paper and make up the volume up to 100 ml. Take fehling's solution (10 ml) and add sample in a drop wise manner into it after this heat to boiling at 80oC over the hot plate until the mixture appears to be nearly reduced. 3-5 drops of (1% methylene blue) add into it and titrate till the blue colour is discharged. Note the reading and calculate the %age of glucose.

7.6.1.2 Non- reducing sugars:

Take appropriate amount of sample and neutralize with 10 percent solution of sodium hydroxide in water. Evaporate on 50°C on water bath to remove the alcohol until the half of volume till remain. Cool the solution and add 10 ml clarifying solution I, and equal volume of clarifying solution II. Mix, filter with filter paper. Add 15 ml of 0.1 N hydrochloric acid in the filtrate, cover it with stopper and boiling for two minutes. After adding phenolphthalein neutralize it with 10 percent solution of sodium hydroxide. Take the solution in 100 ml of volumetric flask and makeup the volume up to 100 ml and perform the titration for the reducing sugars. For the calculation of percentage of total sugars, subtract the percentage of reducing sugars from the sugars to obtained non reducing sugars.

Non- reducing sugars= (Total sugar – Reducing sugar) × 0.95

7.7 Thin Layer Chromatography¹²³

7.7.1 Materials and Methods

Thin layer chromatography is the chromatographic techniques where solute disperse between two phases:

- 1) Stationary phase as a thin layer of adsorbent on a glass plate.
- 2) Mobile phase as a fluid/ liquid.

7.7.1.1 Materials

The equipment required for TLC

- 1) Glass plates (Flat uniform).
- 2) An adjusting plate on which the plates can be put while applying the substance.
- 3) The Finely divided coating material contain fluorescing material which help to visualizing the spots that absorb ultraviolet light.

EXPERIMENTAL WORK

- 4) A spreader to spread the coating material over the whole surface of plate, for uniformly thickness.
- 5) A micro- pipettes for the spotting on the dried plates.
- 6) A developing chamber to run the plates spotted with the sample.
- 7) A sprayer for visualization of spots.
- 8) A ultra-violet light reasonable for perception at short (254 mm) and long (366 mm) ultra-violet wave length.

7.7.1.2 Preparation of test solution.¹²⁴

Test Solution: 5 g of prepared formulation reflux with 25 ml of methanol. After that sample dried on a water bath at definite temperature. Sufficient quantity of methanol added to 20 mg of powdered sample for spotting.

7.7.1.3 Test Solution for *trikantadi kwath*, *trikantakadi kwath syrup*, *trikantakadi kwath tincture* and *trikantadi kwath ghana vati*.¹²⁵

Concentrated ethanolic extract is used as test solution for spotting on TLC plates. [Table 8.27, 8.40] & [Figure 8.67-8.70 & 8.74-8.76]

7.7.1.4 Method

- 1) Prepared the coating suspension and spread (0.25 to 0.30) over the plates (20 cm long), with the help of spreader. After that the coated plates are dried in air and then heated at a temperature of 100-150°C for 30 minutes. On cooling the plates are placed in desiccating chamber to protect it from moisture.
- 2) Prepare the developing chamber to run the TLC plates and saturated the chamber with filter paper before use. The developing chamber is closed with lid and allowed to stand for one hour at room temperature.
- 3) Sample to be examined applied a circular spots about 2 to 6 mm in diameter, on a line parallel with and 20 mm from one end of the plate and not closer than 20 mm to the side; the spots ought to be 15 mm apart. After drying the spots, chromatoplate is place in developing chamber in vertical position. Plate are removed after running in chamber, drying and visualized by spraying the appropriate spraying reagent, and then calculated the R_f value.

R_f value = Distance travel by solute/ Distance travel by solvent

7.8 Phytochemical investigation[Table 8.2, 8.17, 8.41]

7.8.1 Alkaloids test¹²⁶

7.8.1.1 Mayer's reagent

Mayer's reagent is utilized to identify alkaloids, gives cream precipitate. 20 ml of distilled water dissolved 1.3 g of mercuric chloride and in the same manner 5gm of potassium iodide dissolved in 20 ml of purified water. Mixed the 2 prepared solutions and adjusted the volume to 100 ml with distilled water.

7.8.1.2 Dragendorff's reagent:

It is used to detect the alkaloids give orange brown colour in the presence of alkaloids. 5.2 g of basic bismuth carbonate boiled with 14 g of sodium chloride in 50 ml of glacial acetic acid. Allowed to stand overnight and filtered the precipitate of sodium acetate crystals. 40 ml of red brown filtered 120 ml of ethyl acetate and 1 ml of water are added and preserved in amber colour bottle.

7.8.1.3 Hager's reagent

Picric acid solution used for the detection of alkaloids and gives yellow colour indicated the presence of alkaloid.

7.8.1.4 Wagner's reagent

(Iodine potassium iodide solution) It gives reddish brown precipitates if drugs contain alkaloids.

7.8.2 Flavonoids test

7.8.2.1 Shinoda test¹²⁷

Test solution add few magnisium chips and conc. hydrochloric acid in drop wise drop manner, pink scarlet crimson red colour or green to blue colour appears after few time intervals.

7.8.2.2 Zinc hydrochloric test¹²⁸

Take test solution and add a mixture of zinc dust and concentrated hydrochloric acid. After few minutes later it gives red colour in the presence of Flavonoids.

7.8.3 Glycoside test

7.8.3.1 Anthraquinone glycoside test

7.8.3.1.1 Borntrager's test¹²⁹

Powdered drugs are extracted with ether or water immiscible organic solvent. Then in the filtered extract added the caustic soda or ammonia to make it alkaline, after shaking aqueous layer shows pink, red or violet colour.

7.8.3.2 Steroidal glycoside

7.8.3.2.1 Legal test¹³⁰

Extract of drug added pyredine, sodium nitro prusside and it gives pink or red colour indicated the presence of steroidal glycoside.

7.8.3.2.2 Killer- kiliani test¹³¹

1 g of drugs in powdered form boiled with 10ml of 70% alcohol for 2-3 minutes. Filtered the extract and in the filtrate added, 5ml water and 0.5 ml strong solution of lead acetate. Shake well and separate out the filtrate. The clear filtrate is treated with equal volume of chloroform and then evaporated to yield the extract. Extract added glacial acetic acid, after cooling, 2 drops of ferric chloride solution is added into it. Add 2 ml of conc. Sulphuric acid. A reddish brown layer obtained, after standing for few minutes, bluish- green colour appear due to the presence of digitoxose.

7.8.3.2.3 Saponins glycoside test:-

7.8.3.2.3.1 Froth formation test¹³²: Test tube containing 2 ml aqueous drugs solution, after shaking stable froth is formed.

7.8.4 Tannins

7.8.4.1 Ferric chloride test¹³³

Extract are treated with ferric chloric solution, gives blue colour in the presence of hydrolysed tannins and green colour if condensed tannins are present.

7.8.4.2 Lead acetate test¹³⁴

In 10 ml of extract add 0.5 ml of 1% lead acetate solution gives the precipitates.

7.8.5 Carbohydrates

7.8.5.1 Reduction of Fehling's solution¹³⁵

Add equal quantity of Fehling's solution A and B in the solution of carbohydrate, brick red precipitate is obtain after heating indicated the presence of carbohydrate.

7.8.6 Pectin¹³⁶

5 ml (1 percent) solution add 1ml (2 percent) solution of potassium hydroxide and place at room temperature for 15 minutes. A transparent gel or semi- gel forms. Dilute hydrochloric acid is added to acidify gel and after this shake well. Voluminous, colourless, gelatinous precipitate forms which when boiled becomes white and flocculent.

7.9 *In vitro* study¹³⁷

7.9.1 Preparation of artificial urine in laboratory

Burns and Finlayson method:- Artificial urine have different composition like, sodium chloride 105.5% mmol/l, sodium phosphate 32.3 mmol/l, sodium citrate 3.21 mmol/l, magnesium sulphate 3.85 mmol/l, sodium sulphate 16.95 mmol/l, potassium chloride 63.7 mmol/l, calcium chloride 4.5 mmol/l, sodium oxalate 0.32 mmol/l, ammonium hydroxide 17.9 mmol/l, and ammonium chloride 0.0028 mmol/l. P^H adjusted to 6.0 and artificial urine prepared fresh in each time.

1. Study without inhibitor

1.0 ml artificial urine transferred into the cell and also add 0.5 ml of distilled water into it then take the blank reading. After this 0.5 ml of 0.01M sodium oxalate was added, to the previous content and immediately started the measurement for a period of ten minutes. Six replicates were taken for each experiment.

2. Study with inhibitor

Dissolved the extract of prepared dosage form in distilled water, filtered it through membrane filter and make 50, 100, 150, 200 and 250 µg/ml concentration solution. Mixture of 1 ml of artificial urine and 0.5 ml of extract solution is versed into the cell. A blank reading was taken and added 0.5 ml of 0.01 M Na oxalate solute then immediately absorbance was measured for a period of 10 minute at 620 nm. Six replicates were taken for each experiment.

$$\text{Percentage of inhibition} = \{1 - [Si / Sc]\} \times 100$$

Si = Slope of graph in presence of inhibitor (extract)

Sc = Slope of graph without inhibitor (control)

7.9.2 Microscopic study: Under the 40X objective and 10X eye piece observed the crystals of calcium oxalate (with and without inhibitors). [Table 8.49] & [Figure 8.85- 8.93]

7.10 Stability study

7.10.1 Stability study of syrup and tincture (24hr, 48hr, 72hr) ¹³⁸

Stability testing of the prepared formulations like syrup and tincture was performed by taken nine portions of the final syrup (SA1, SA2, SA3, SB1, SB2, SB3, SC1, SC2, SC3) and tincture (TA1, TA2, TA3, TB1, TB2, TB3, TC1, TC2, TC3) in amber colored glass bottles and were kept at accelerated temperature condition at 4°C, room temperature and 47°C respectively. All the physicochemical parameters were studied at the interval of 24 hr, 48 hr and 72 hr to observe any change. [Table 8.29, 8.32]

7.10.2 Stability study of syrup and tincture (6 months) [Table 8.30, 8.31, 8.33, 8.34] ^[139, 140]

Stability study of prepared formulations was performed by keeping the samples in an amber coloured glass bottle at accelerated temperature condition ($40^{\circ}\text{C} \pm 2^{\circ}\text{C}/ 75\%\text{RH} \pm 5\%$). The physicochemical, TLC and phytochemical parameters of the samples were tested at the interval of 0 day and 6 months to observed the change.

7.10.3 Stability study of *trikantakadi kwath ghana churna*, *trikantakadi kwath ghana churna* with excipient and *trikantakadi kwath ghana vati* [Table 8.35- 8.38]¹³⁹

Stability study of *trikantakadi kwath ghana churna*, *trikantakadi kwath ghana churna* with excipient and *trikantakadi kwath ghana vati* was performed by keeping the samples in an aluminium foil covered petri dish at accelerated temperature condition ($40^{\circ}\text{C} \pm 2^{\circ}\text{C}/ 75\%\text{RH} \pm 5\%$). All the parameters of the samples were tested at the interval of 15 days, 20 days and 30 days to observe the change.

8. RESULT AND DISCUSSION

CHAPTER 8

RESULT AND DISCUSSION

8.1 Pharmacognostic and physiochemical study of ingredients

8.1.1 Monograph for *gokshura* fruit

8.1.1.1 Morphological characters of *gokshura* fruit



Figure 8.1: Morphological characters of *gokshura* fruits

Figure 8.2: Measurement of *gokshura* fruit

Table 8.1: Depicting the organoleptic characters of *gokshura* fruits

Sr. No.	Contents	Observations
1.	Colour	Yellowish
2.	Odour	Characteristics
3.	Taste	<i>Madhura</i>
4.	Touch	Rough bearing spikes
5.	Surface	Rough and spine
6.	Fracture	Hard
7.	Size	1.3 cm
8.	Shape	Five angled spherical in shape

8.1.1.2 Microscopical characters of the fruits of *gokshura*

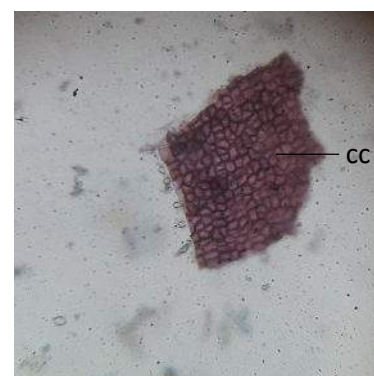
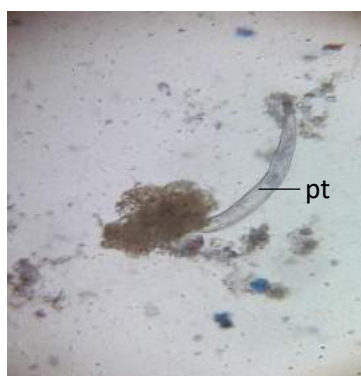
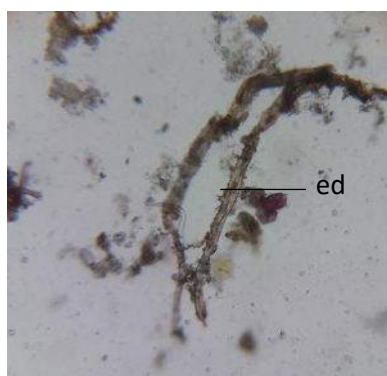


Figure 8.3

Figure 8.4

Figure 8.5

RESULT AND DISCUSSION



Figure 8.6

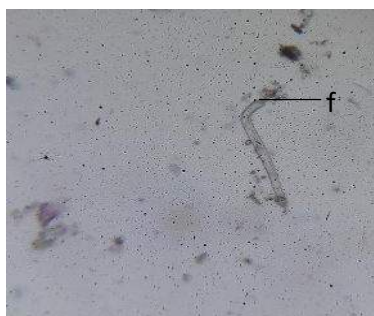


Figure 8.7

ed- elongated duct, pt- pitted tracheid, cc- cork cell, v- vessels, f- fiber

8.1.1.3 Physicochemical properties of *gokshura* fruits

Table 8.2: Depicting the physicochemical properties of *gokshura* fruits

S.N	Parameter	<i>Gokshura</i> (Fruit)				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	6.8%	6.9%	6.8%	6.8%
2.	F.M. (%w/w)	NMT 1%	0.01%	0.01%	0.02%	0.01%
3.	T.A. (%w/w)	NMT 15%	4.17%	4.17%	4.18%	4.17%
4.	A.I.A. (%w/w)	NMT 2%	0.95%	0.94%	0.95%	0.94%
5.	A.S.E. (%v/w)	NLT 6%	10.14%	10.13%	10.15%	10.14%
6.	W.S.E. (%v/w)	NLT 10%	15.17%	10.17%	16%	13.78%

8.1.2 Monograph for *amaltaas* pulp

8.1.2.1 Morphological characters of *amaltaas* pulp



Figure 8.8: Morphological character of fruit



Figure 8.9: Measurement of sample

Pulp of *amaltaas*

Table 8.3: Depicting the organoleptic characters of *amaltaas* fruits

Sr. No.	Contents	Observations
1.	Colour	Black
2.	Odour	Characterstics

RESULT AND DISCUSSION

3.	Taste	<i>Madhura, tikta</i>
4.	Touch	Sticky
5.	Surface	Smooth
6.	Size (pode)	14 cm
7.	Shape (pode)	Irregular

8.1.2.2 Physicochemical properties of fruit pulp of *amaltaas*

Table 8.4: Depicting the physiochemical properties of fruit pulp of *amaltaas*

S.NO.	Parameter	<i>Amaltaas</i> (Fruit pulp)				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	18.44%	18.45%	18.44%	18.44 %
2.	F.M. (%w/w)	NMT 2%	0.01%	0.01%	0.02%	0.01 %
3.	T.A. (%w/w)	NMT 6%	1.89%	1.80%	1.65%	1.78 %
4.	A.I.A. (%w/w)	NMT 1%	0.018%	0.01%	0.016%	0.01 %
5.	A.S.E. (%v/w)	NLT 15%	7.4%	7%	8.5%	7.6 %
6.	W.S.E. (%v/w)	NLT 46%	66%	66.2%	63%	65.05 %

8.1.3 Monograph for *durbhamoola*

8.1.3.1 Morphological characters of *durbhamoola*



Figure 8.10: Morphological character of root of *durbha*



Figure 8.11: Measurement of root sample of *durbha*

Table 8.5: Depicting the organoleptic characters of *durbha* root

Sr. No.	Contents	Observations
1.	Colour	Creamish yellow
2.	Odour	Characteristics
3.	Taste	<i>Madhura, tikta, kasaya</i>
4.	Touch	Smooth

RESULT AND DISCUSSION

5.	Fracture	Short
6.	Size	8.3 cm
7.	Shape	Regular

8.1.3.2 Powder characteristics of roots of *durvha*



Figure 8.12

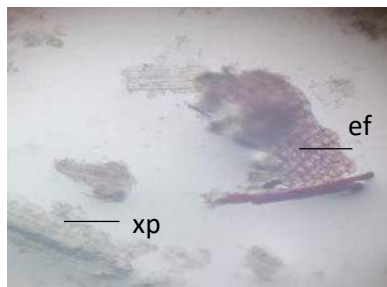


Figure 8.13

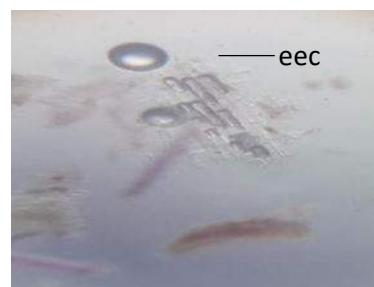


Figure 8.14

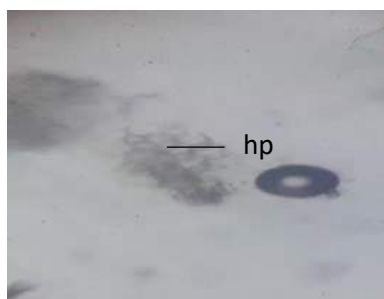


Figure 8.15

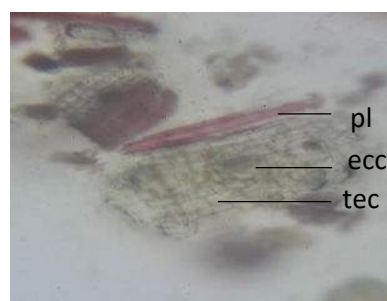


Figure 8.16

Lcs- longitudinally cut sclereids, ef- Fragment of epidermis, xp- Xylem parenchyma, ecc- Elongated cubical cell, hp- Part of hypodermis, tec- Tangentially elongated cell, pl- Paliferous layer

8.1.3.3 Transverse section of root of *durvha*

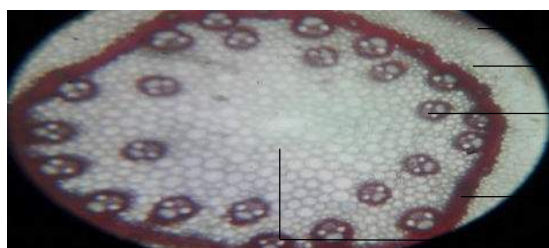


Figure 8.17

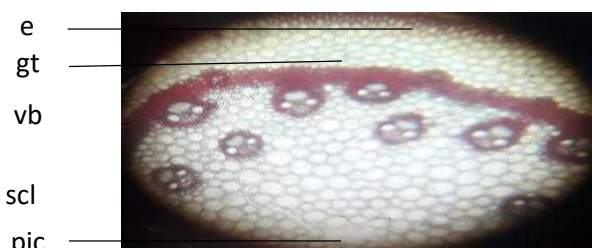


Figure 8.18

T.S. of root of *Cynodon dactylon*, e. epidermis, gt. ground tissue, scl. Sclerenchyma, pic. Pith cavity, vb. Vascular bundle.

8.1.3.4 Physicochemical study of roots of *durvha*

Table 8.6: Depicting the physicochemical parameters of *Durvha*

S.NO.	Parameter	<i>Durva (Roots)</i>				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	6%	4.5%	5%	5.16%

RESULT AND DISCUSSION

2.	F.M. (%w/w)	NMT 2%	0.001%	0.02%	0.01%	0.01%
3.	T.A. (%w/w)	NMT 7%	7%	6.30%	6.20%	6.5%
4.	A.I.A. (%w/w)	NMT 3%	0.06%	0.1%	0.5%	0.22%
5.	A.S.E. (%v/w)	NLT 1%	6.482%	6.5%	6.80%	6.594%
6.	W.S.E. (%v/w)	NLT 5%	29.6%	29.2%	29.20%	29.33%

8.1.4 Monograph for *javasha* (Whole plant)

8.1.4.1 Morphological characters of whole plant of *javasha*



Figure 8.19: Morphological character of *javasha* (Whole plant part) **Figure 8.20:** Measurement of sample

Table 8.7: Depicting the organoleptic characters of *javasha*

Sr. No.	Contents	Observations
1.	Colour	Creamish yellow
2.	Odour	Characteristics
3.	Taste	<i>Madhura, tikta, kasaya</i>
4.	Touch	Rough
5.	Surface	Longitudinally
6.	Fracture	Short
7.	Size	5.5 cm
8.	Shape	Cylindrically

8.1.4.2 Powder microscopy of *javasha*



Figure 8.21

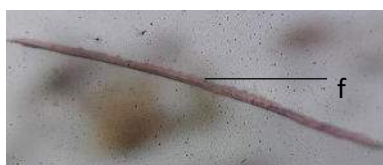


Figure 8.22



Figure 8.23



Figure 8.24

fb- Fiber, bundle, f- Fibers, pc- Prismatic crystal, e- epidermal cell

8.1.4.3 Transverse section of javasa (stem part)

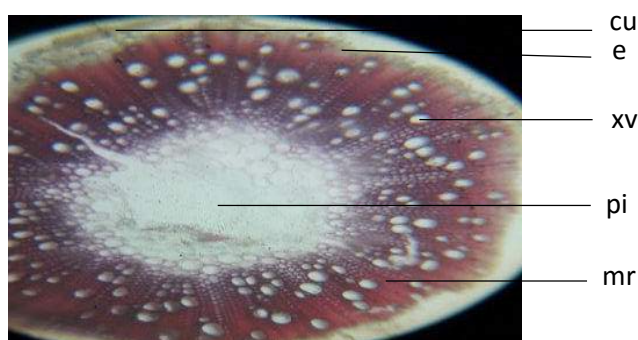


Figure 8.25

TS of roots of *Alhagi camelorum*, cu.- Cuticle, e. epidermis, pi. Pith, ph. Phloem, mr. medullary rays, xv. Xylem vessels

8.1.4.4 Physicochemical study of javasha

Table 8.8: Depicting the physicochemical parameters of *javasha*

S.NO.	Parameter	<i>Javasa (Whole part)</i>				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	10.64%	9.5%	10%	10.04%
2.	F.M. (%w/w)	NMT 2%	0.2%	0.1%	0.2%	0.16%
3.	T.A. (%w/w)	NMT 13.5%	12.07%	12.04%	11.8%	11.97%
4.	A.I.A. (%w/w)	NMT 2.5%	2.5%	2%	2.3%	2.26%
5.	A.S.E. (%v/w)	NLT 2%	5.12%	6%	6.5%	5.87%
6.	W.S.E. (%v/w)	NLT 10%	11.3%	11.4%	11%	11.23%

8.1.5 Monograph for roots of pashanbheda

8.1.5.1 Morphological characters of roots of pashanbheda



Figure 8.26: Morphological character of roots of *pashanabheda*

Figure 8.27: Measurement of root sample

Table 8.9: Depicting the organoleptic characters of *pashanabheda* root

S.No.	Content	Observation
1.	Colour	Blackish brown

RESULT AND DISCUSSION

1.	Odour	Characteristics
3.	Taste	<i>Tikta, kasaya</i>
4.	Touch	Rough
5.	Surface	Longitudinally striation
6.	Fracture	Hard
7.	Size	2.2cm
8.	Shape	Cylindrical

8.1.5.2 Powder microscopy of roots of *pashanabheda*



Figure 8.28



Figure 8.29



Figure 8.30



Figure 8.31

xv- xylem vessels, pc- Parenchymatous cell, rv- Reticulate vessel, f-Fibers

8.1.5.3 Transverse section of roots of *pashanabheda*

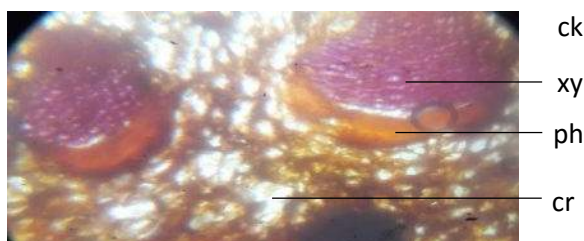


Figure 8.32

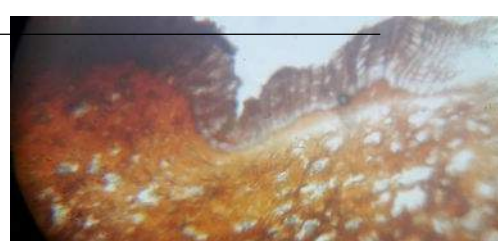


Figure 8.33

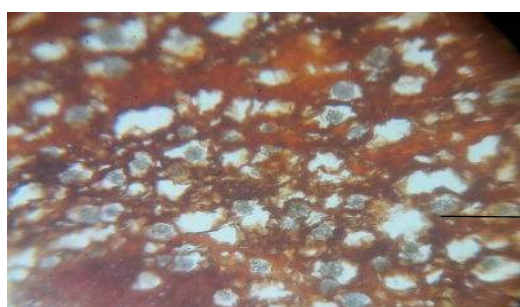


Figure 8.34

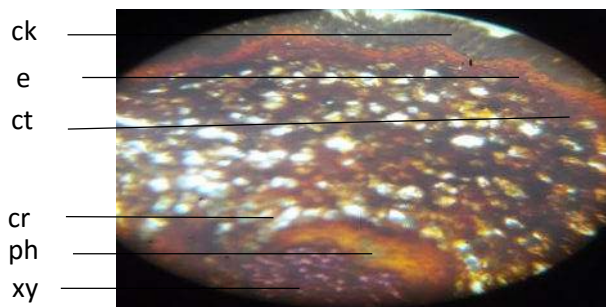


Figure 8.35

TS of rhizome of *Bergenia ciliata*, e.epidermis, cr. Calcium oxalate crystal, ck. Cork, ct. cortex, ph. Phloem, xy. Xylem.

RESULT AND DISCUSSION

8.1.5.4 Physiochemical study of root of *pashanabheda*

Table 8.10: Depicting the physiochemical parameters of *pashanabheda* roots

S.No.	Parameters	<i>Pashanabheda</i> (Whole plant)				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	10.1%	9.5%	9.8%	9.8%
2.	F.M. (%w/w)	NMT 2%	0.99%	0.97%	0.80%	0.92%
3.	T.A. (%w/w)	NMT 13%	11.84%	11.80%	11.5%	11.71%
4.	A.I.A. (%w/w)	NMT 0.5%	0.4%	0.1%	0.2%	0.23%
5.	A.S.E. (%v/w)	NLT 9%	10.04%	10.07%	10.08%	10.06%
6.	W.S.E. (%v/w)	NLT 15%	15.33%	15.34%	15.33%	15.33%

8.1.6 Monograph for fruit of *harar*

8.1.6.1 Morphological characters of fruit of *harar*



Figure 8.36: Morphological character of *harar* fruit



Figure 8.37: Measurement of sample of fruits

Table 8.11: Depicting the organoleptic characters of *harar* fruits

Sr. No.	Contents	Observations
1.	Colour	Creamish brown
2.	Odour	Characteristics
3.	Taste	<i>Madhura, Amala, Katu, Tikta, Kasaya.</i>
4.	Touch	Rough
5.	Surface	Rough, Striated
6.	Fracture	Hard
7.	Size	3 cm
8.	Shape	Oval, Regular

8.1.6.2 Powder microscopy of fruit of *harar*



Figure 8.38



Figure 8.39

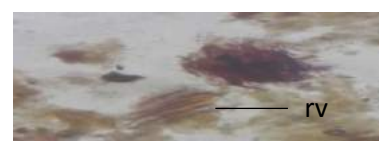


Figure 8.40



Figure 8.41



Figure 8.42



Figure 8.43

mu- Multicellular uniseriate hair, xy- xylem vessels, rv- reticulated vessels, ec- epicarp cell, pc- parenchymatous cell, lc- lignified cell

8.1.6.3 Transverse section of fruit pulp of *harar*

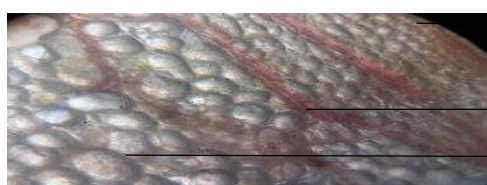


Figure 8.44

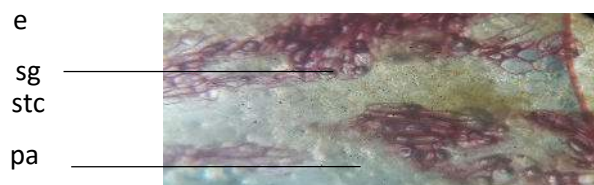


Figure 8.45

TS of fruit pulp of *Terminalia chebula*, e. epidermis, sg. Starch grain, stc. Stone cells, pa. parenchyma.

8.1.6.4 Physicochemical study of fruit pulp of *harar*

Table 8.12: Depicting the physicochemical parameters of *harar* fruits

S.NO.	Parameter	<i>Harar</i> (Fruit pulp)				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	8.5%	8.6%	8.6%	8.56%
2.	F.M. (%w/w)	NMT 1%	0.68%	0.65%	0.66%	0.66%
3.	T.A. (%w/w)	NMT 5%	3.05%	3.46%	3.25%	3.25%
4.	A.I.A. (%w/w)	NMT 5%	0.04%	0.04%	0.03%	0.03%
5.	A.S.E. (%v/w)	NLT 40%	57.46%	57.45%	57.46%	57.45%
6.	W.S.E. (%v/w)	NLT 60%	60.9%	60.9%	60.6%	60.8%%

8.1.7 Monograph for whole plant part of *pitpapda*

8.1.7.1 Morphological characters of plant part of *pitpapda*



Figure 8.46: Morphological character of whole plant part of *pitpapda*

Table 8.13: Depicting the organoleptic characters of *pitpapda*

Sr. No.	Contents	Observations
1.	Colour	Light green
2.	Odour	Characteristics
3.	Taste	<i>Tikta</i>
4.	Touch	Rough
5.	Fracture	Short
6.	Shape	Regular

8.1.7.2 Powder microscopy *pitpapda*



Figure 8.47



Figure 8.48



Figure 8.49

f- fibers fragments, pv- pitted vessels, pc- prismatic crystal

8.1.7.3 Transverse section of *pitpapda* (stem part)

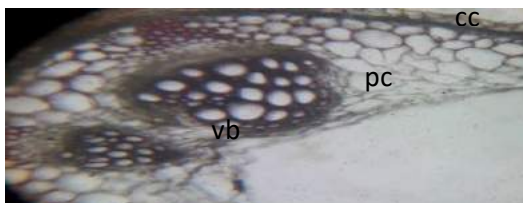


Figure 8.50

TS of *Fumaria vaillantii*, e. epidermis, vb. Vascular bundles, pc. Parenchyma, cc. collenchyma cells

RESULT AND DISCUSSION

8.1.7.4 Physiochemical study of *pitpapda*

Table 8.14: Depicting the physiochemical parameters of *pitpapda*

S.NO.	Parameter	<i>Parpata (whole plant)</i>				
		Standard (API)	Raw material (Batch)			
			I	II	III	Mean
1.	LOD (%w/w)	-	10.06%	10.05%	10.06%	10.05%
2.	F.M. (%w/w)	NMT 2%	0.03%	0.04%	0.03%	0.03%
3.	T.A. (%w/w)	NMT 30%	27.05%	27.08%	27.04%	27.05%
4.	A.I.A. (%w/w)	NMT 10%	6.960%	6.9%	6.8%	6.88%
5.	A.S.E. (%v/w)	NLT 7%	9.4%	9.4%	9.3%	9.36%
6.	W.S.E. (%v/w)	NLT 29%	16%	16.2%	16%	16.06%

8.1.8 Monograph for *kaasmoola*

8.1.8.1 Morphological characters of *kaasmoola*



Figure 8.51: Morphological character of root of *kaasmoola*



Figure 8.52: Measurement of sample of *kaasmoola*

Table 8.15: Depicting the organoleptic characters of *kaasmoola*

Sr. No.	Contents	Observations
1.	Colour	Creamish brown
2.	Odour	Characteristics
3.	Taste	<i>Madhura, tikta</i>
4.	Touch	Rough
5.	Surface	Striated
6.	Fracture	Hard
7.	Size	5.5 cm
8.	Shape	Cylindrical

8.1.8.2 Powder characteristics of kaasmool

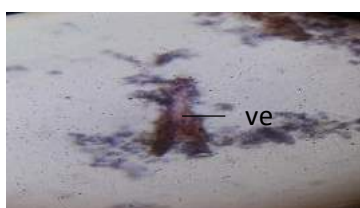


Figure 8.53



Figure 8.54



Figure 8.55



Figure 8.56

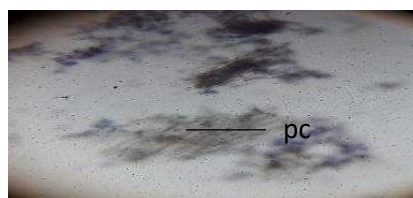


Figure 8.57

ve- vessel element, ec- epidermal cell, f- fiber, fb- fiber bundle, pc- parenchymatous cell

8.1.8.3 Transverse section of roots of kaas



Figure 8.58

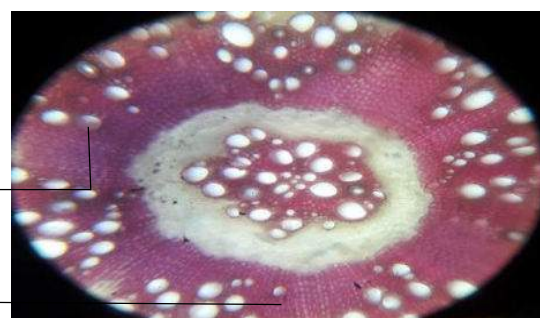


Figure 8.59

Per- pericycle, ct- cortex, xy- xylem vessels, e- epidermal cell, exd- exodermis, mr- medullary rays

8.1.8.4 Physicochemical study of roots of kaas

Table 8.16: Depicting the physicochemical parameters of *kaasmoola*

S.NO.	Parameter	<i>Kaasmool (Roots)</i>			
		Raw material (Batch)			
		I	II	III	Mean
1.	LOD (%w/w)	6% w/w	6.01%	6%	6.0%
2.	F.M. (%w/w)	0.8%w/w	0.8%	0.8%	0.8%
3.	T.A. (%w/w)	8.3% w/w	8.4%	8.3%	8.3%
4.	A.I.A. (%w/w)	0.025% w/w	0.024%	0.024%	0.024%
5.	A.S.E. (%v/w)	6.678% v/w	6.67%	6.67%	6.672%
6.	W.S.E. (%v/w)	12.31% v/w	12.31%	12.30%	12.30%

RESULT AND DISCUSSION

8.2 Phytochemical investigation of raw ingredients.

Table 8.17: Depicting the phytochemical investigation of raw materials

S.N.	Name of drugs	Chemical constituents	Test	Phytochemical investigation
1.	<i>Haratiki</i>	Tannins	Ferric chloride test	+ve
			Lead acetate test	+ve
		Anthraquinone glycoside	Borntrager's test	+ve
2.	<i>Gokshura</i>	Sterols	Killer- killani test	+ve
			Legal test	+ve
		Saponin and sapogenin glycoside	Foam test	+ve
3.	<i>Pasanabheda</i>	Tannins	Ferric chloride test	+ve
			Lead acetate test	+ve
4.	<i>Parpata</i>	Tannins	Ferric chloride test	-ve
			Lead acetate test	+ve
5.	<i>Amaltaas</i>	Anthraquinone glycoside	Borntrager's test	+ve
		Pectin		+ve
6.	<i>Kaasmool</i>	Alkaloids	Mayer's reagent	+ve
			Dragendroff reagent	+ve
			Wagner's reagent	+ve

RESULT AND DISCUSSION

			Hager's reagent	+ve		
		Tannins	Ferric chloride test	-ve		
			Lead acetate test	+ve		
7.	<i>Javasa</i>	Alkaloids	Mayer's reagent	+ve		
			Dragendroff reagent	+ve		
			Wagner's reagent	+ve		
			Hager's reagent	+ve		
		Tannins	Ferric chloride test	+ve		
			Lead acetate test	+ve		
		8.	<i>Durva</i>	Alkaloid	Mayer's reagent	+ve
					Dragendroff reagent	+ve
Wagner's reagent	+ve					
Hager's reagent	+ve					
Tannins	Ferric chloride test			-ve		
	Lead acetate test			+ve		
Flavonoids	Shinoda test			+ve		

+ Positive result, - Negative result

RESULT AND DISCUSSION

Interpretation

All the samples of raw material are studied macroscopically, microscopically, physicochemical and phytochemically that showed that all the sample compliances with the standard value prescribed in the monograph. For the *kaasmool* mean value obtain after 3 trials are considered as standard. [Table 8.1-8.17].

8.3 Pharmaceutical study

8.3.1 *Trikantakadi kwath*

Table 8.18: Depicting the quantity of *trikantakadi kwath* obtained

S.No.	Quantity of Ingredients (g)	Quantity of <i>trikantakadi kwath</i> obtained (ml)
1.	500	1000

8.3.1.1 Organoleptic characters of *trikantakadi kwath*

State: Liquid

Colour: Dark brown

Odour: Characteristics

Taste: *Tikta, kashya*



Figure 8.60: TK

8.3.2 *Trikantakadi kwath syrup*

Table 8.19: Depicting the quantity of *trikantakadi kwath syrup* obtained

S.No.	Quantity of Ingredients (g)	Quantity of <i>trikantakadi kwath syrup</i> obtained (ml)
1.	500	1000

8.3.2.1 Organoleptic characters of *trikantakadi kwath syrup*

State: Liquid

Colour: Dark brown

Odour: Brown

Taste: *Madhura, tikta*



Figure 8.61: TKS

8.3.3 *Trikantakadi* tincture

Table 8.20: Depicting the quantity of *trikantakadi* tincture obtained

S.No.	Quantity of Ingredients (g)	Quantity of <i>trikantakadi</i> tincture obtained (ml)
1.	200	700

8.3.3.1 Organoleptic characters of *trikantakadi* tincture

State: Liquid

Colour: Brown

Odour: Alcoholic fragrance

Taste: *Kashya, tikta*

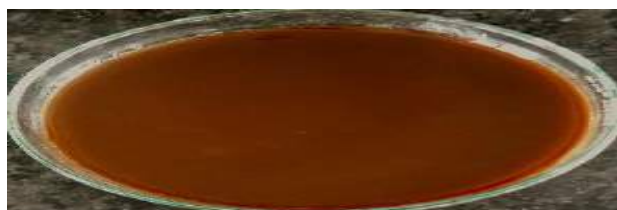






Figure 8.62: TT

8.3.4 *Trikantakadi kwath ghana vati*

Table 8.21A: Depicting the quantity of *trikantakadi ghana vati*

S.No.	Batch	Quantity of ingredients (mg)	Quantity of <i>trikantakadi ghana vati</i> (Tablets 550 mg)
1.	I	15,000	30
2.	II	14,850	30
3.	III	2,000	10
4.	IV	12,000	60

Table 8.21B: Organoleptic characters of *trikantakadi kwath ghana vati*

Parameters	Batch (I)	Batch (II)	Batch (III)	Batch (IV)
State:	Solid	Solid	Solid	Solid
Colour:	Dull brownish	Dull brownish	Creamish white	Creamish white
Odour:	Characteristics	Characteristics	Characteristics	Characteristics
Taste:	<i>Kashya, tikta</i>	<i>Kashya, tikta</i>	<i>Kashya</i>	<i>Kashya</i>
	 <p>Figure 8.63: TKGV</p>	 <p>Figure 8.64: TKGV</p>	 <p>Figure 8.65 TKGV</p>	 <p>Figure 8.66 TKGV</p>

RESULT AND DISCUSSION

8.4 Analytical/ physicochemical study

8.4.1 Results of physicochemical standardization of *trikantakadi kwath*

Table 8.22: Physicochemical parameters of *trikantakadi kwath*

S. No.	Parameters	Observed result			
		Batch (<i>Kwath</i>)			
		I	II	III	Mean value
1.	Total ash(% w/w)	1.5	1	1	1.166
2.	Acid Insoluble ash(% w/w)	0.3	0.4	0.5	0.4
3.	Total solid content(% w/v)	19.32	19.31	19.33	19.32
4.	pH meter	4.77	4.77	4.78	4.77
5.	Specific gravity at 25°C (g/ml)	1.028	1.029	1.028	1.028
6.	Viscosity (millipoise)	1.379	1.350	1.379	1.369
7.	Wt/ml (g)	1.026	1.025	1.026	1.026
8.	Refractive index at room temperature	1.351	1.352	1.352	1.351

8.4.2 Results of physicochemical standardization of *trikantakadi kwath* syrup

Table 8.23: Physicochemical parameters of *trikantakadi kwath* syrup

S. No.	Parameters	Observed result			
		Batch (Syrup)			
		I	II	III	Mean value
1.	Total ash (% w/w)	3.5	1.5	0.5	1.84
2.	Acid Insoluble ash (% w/w)	0.2	0.1	0.1	0.13
3.	pH meter	4.58	4.59	4.59	4.58
4.	Total sugar content (%v/v) In 10 ppm	8.4	8.4	8.4	8.4
5.	Viscosity (millipoise)	5.648	5.683	5.648	5.659
6.	Wt/ml (g)	1.204	1.18	1.18	1.186
7.	Specific gravity at 25°C (g/ml)	1.208	1.179	1.181	1.189
8.	Total solid content (% w/v)	41.82	43.58	41.98	42.47
9.	Refractive index at room temperature	1.346	1.347	1.347	1.346
10.	Total acidity (%v/v) titrimetric method	0.047	0.048	0.047	0.0473
11.	Reducing sugar (%v/v) titrimetric method	2.77	2.88	3.15	2.9

RESULT AND DISCUSSION

12.	Non reducing sugar (%v/v) titrimetric method	5.40	5.52	5.80	5.57
13.	Total sugar (%v/v) titrimetric method	8.46	8.45	8.45	8.45

8.4.3 Results of physicochemical standardization of *trikantakadi* tincture

Table 8.24: Physicochemical parameters of *trikantakadi* tincture

S. No.	Parameters	Observed result			
		Batch (Tincture)			
		I	II	III	Mean value
1.	Total ash (% w/w)	1.5	1	1	1.166
2.	Acid Insoluble ash (% w/w)	0.5	0.6	0.5	0.53
3.	pH meter	4.76	4.75	4.76	4.756
4.	Specific gravity at 25°C (g/ml)	1.0036	1.004	1.004	1.0038
5.	Wt/ ml (g)	1.0016	1.0012	1.0020	1.0016
6.	Viscosity (millipoise)	1.395	1.425	1.395	1.405
7.	Total solid content (% w/v)	3.5	3	3.2	3.24
8.	Test for methanol	-ve	-ve	-ve	-ve
9.	Reducing sugar (%v/v) titrimetric method	2.77	3.01	2.78	2.85
10.	Non- reducing sugar (%v/v) titrimetric method	7.43	7.88	7.88	7.73
11.	Total sugar (%v/v) titrimetric method	10.6	10.5	10.4	10.5
12.	Total acidity (%v/v) titrimetric method	0.029	0.027	0.029	0.084
13.	Refractive index at room temperature	1.342	1.343	1.342	1.342
14.	Alcohol content (% v/v)	3	3	3	3

-ve; Absent

8.4.4 Analytical parameters of *trikantakadi ghana* and *trikantakadi ghana* with excipient

Table 8.25: Depicting analytical parameters of *trikantakadi ghana* and *trikantakadi ghana* with excipient

S.No	Parameters	R1	R2	R3	Avg.	Re1	Re2	Re3	Avg.
1.	Bulk density	0.66	0.66	0.66	0.66	0.34	0.34	0.33	0.33
2.	Tapped density	0.76	0.76	0.75	0.76	0.40	0.40	0.40	0.40

RESULT AND DISCUSSION

3.	Compressibility index	13.15	13.14	13.15	13.1	17.4	17.5	17.4	17.4
4.	Angle of repose	19.44	19.80	20.80	20.01	21.80	23.02	24.22	23.01

R1- R3; Raw herbs powder, Re1- Re3; Raw herbs with excipient, Avg; Average

8.4.5 Analytical parameters of *trikantakadi kwath ghana vati* (Tablets)

Table 8.26: Depicting analytical parameters of *trikantakadi kwath ghana vati*

S. No.	Parameters	Observed result			
		Batch (Tablet)			
		I	II	III	IV
1.	Shape and appearance	Round	Round	Round	Round
2.	Hardness	1.5 kg/inch ²	4 kg/inch ²	4.5 kg/inch ²	4 kg/inch ²
3.	Thickness and diameter	4 mm, 10.3 mm	4 mm, 10.3 mm	4 mm, 10.3 mm	4 mm, 10.3 mm
4.	Friability	3.66% w/w	2% w/w	1.001%w/w	0.20%w/w
5.	Weight variation test	1.8%w/w	1.7%w/w	1.8%w/w	1.8%w/w
6.	Assay	-	-	95.01%	99.89%
7.	Dissolution test (% drugs release)	-	-	91% drug release in 2 hr	99.28% drug release in 2 hr
8.	Disintegration time (at 28-32 rpm)	8 min	14 min	48 min	18 min

Hr; Hours, min; minutes

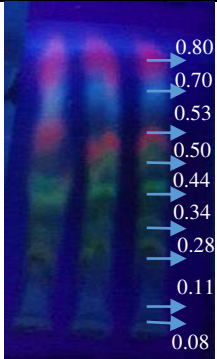
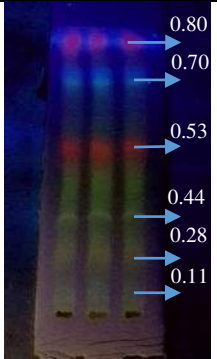
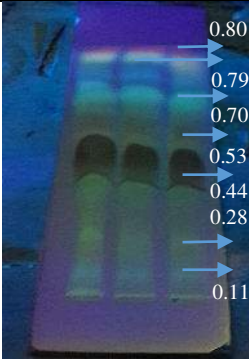
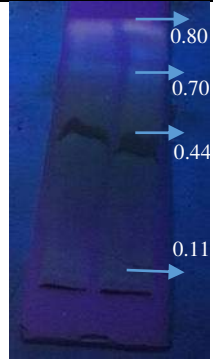
Interpretation

TK, TKS, and TT showed the good result [Table 8.22- 8.24]. And all the calculated parameters of TKGCE, TKGCE and TKGCV are compliances with the standard reference value prescribed in the monograph [Table 8.25-8.26].

8.5 TLC

8.5.1 TLC profiling of the *trikantakadi kwath*, *trikantakadi kwath ghana vati* (Tablets), *trikantakadi kwath* syrup & *trikantakadi tincture*

Table 8.27: Depicting the TLC of *trikantakadi kwath*, *trikantakadi kwath ghana vati* (Tablets), *trikantakadi kwath* syrup & *trikantakadi tincture*

Mobile phase- Ethyl acetate: Methanol: Ethanol: Water (81:11:4:8)				
Stationary phase- Silica gel G	Figure: 8.67 TK	Figure: 8.68 TKGV	Figure: 8.69 TKS	Figure: 8.70 TT
Extract used for spotting: Methanolic extract (No spots observed under visible light)	Observed R_f value under 365 nm: 0.08, 0.11, 0.28, 0.34, 0.44, 0.50, 0.53, 0.70, 0.80	Observed R_f value under 365 nm: 0.11, 0.28, 0.44, 0.53, 0.70, 0.80	Observed R_f value under 365 nm: 0.11, 0.28, 0.44, 0.53, 0.70, 0.79, 0.80	Observed R_f value under 365 nm: 0.11, 0.44, 0.70, 0.80

Interpretation

Thin Layer Chromatography of TK and its dosage form were performed. R_f observed between the range of 0.08 to 0.80. In the TK 9 spots were found. Out of 9 only 6 spots were observed on the TLC plate of TKGV. 6 spot with one new spot having R_f range 0.79 were observed on the TLC plate of TKS that can be due to the presence of excipient used for the preparation. In case of TT only 4 spot were observed. [Table 8.27] & [Figure 8.67-8.70].

RESULT AND DISCUSSION

8.6 Phytochemical investigation of the prepared dosage forms

Table 8.28: Depicting phytochemical investigation of the prepared dosage forms

S. No.	Chemical constituents	Test	TK	TKS	TT	TKGV
1.	Alkaloid	Mayer's reagent	+	+	+	+
		Dragendroff's reagent	+	+	+	+
		Wagner's reagent	+	+	+	+
2.	Tannin	Ferric chloride test	+	+	+	+
		Lead acetate test	+	+	+	+
3.	Anthraquinone glycoside	Borntrager's test	+	+	+	+
4.	Sterol/ Steroids	Legal test	+	+	+	+
		Killer- killani test	+	+	+	+
		Salkowaski test	+	+	+	+
5.	Flavonoids	Shinoda test	+	+	+	+
6.	Test for terpenoids	Liebermann-burchard's test	+	+	+	+
		Salkowaski test	-	-	-	-
7.	Reducing sugar	Benedict test	NA	-	+	NA
		Fehling test	NA	-	+	NA
8.	Non reducing sugar	Benedict test	NA	+	-	NA
		Fehling test	NA	+	-	NA

+ (Present), - (Absent), NA- Not applicable

Interpretation

All the prepared formulation showed the presence of all chemical compounds that were present in the ingredients of formulations. [Table 8.28].

RESULT AND DISCUSSION

8.7 Stability Study

8.7.1 Stability study of *trikantakadi kwath* syrup for three days

Table 8.29: Stability studies through physicochemical parameters of *trikantakadi kwath* syrup (after 24hr, 48hr, and 72hr at accelerated temperature conditions)

Sample code	Time duration (In hour)	Temp. (°C)	Physicochemical parameters								
			C	O	Ts	pH	Sp.	R	V	Tu	H
SA1	24 hr.	4°C	NC	NC	NC	4.58	1.18	1.346	5.6	X	Y
SA2		Room temp.	NC	NC	NC	4.58	1.18	1.346	5.6	X	Y
SA3		47°C	NC	NC	NC	4.58	1.17	1.346	5.6	X	Y
SB1	48 hr.	4°C	NC	NC	NC	4.58	1.17	1.346	5.6	X	Y
SB2		Room temp.	NC	NC	NC	4.58	1.17	1.346	5.6	X	Y
SB3		47°C	NC	NC	NC	4.58	1.18	1.346	5.6	X	Y
SC1	72 hr.	4°C	NC	NC	NC	4.58	1.17	1.346	5.6	X	Y
SC2		Room temp.	NC	NC	NC	4.58	1.17	1.346	5.6	X	Y
SC3		47°C	NC	NC	NC	4.58	1.18	1.346	5.6	X	Y

C- Colour, O- Odour, Ts- Taste, Sp.- Specific gravity at room temperature (g/ml), R- Refractive index at room temperature, V- Viscosity (millipoise), Tu- Turbidity, H- Homogeneity, S- Syrup, NC- No change, X- No, Y- Yes

Interpretation

Stability studies through physicochemical parameters of *trikantakadi kwath* syrup (after 24hr, 48hr, and 72hr at accelerated temperature conditions) were done within the specific interval of time period & no significant variation has found in the results, when compared the observed value [Table 8.29] with the previous data of *trikantakadi kwath* syrup. [Table 8.23].

RESULT AND DISCUSSION

8.7.2 Stability study of *trikantakadi kwath* syrup for six months

Table 8.30: Stability studies through physicochemical parameters of *trikantakadi kwath* syrup (0 day)

S. No.	Parameters	Observed result			
		Batch (Syrup)			
		I	II	III	Mean value
1.	Colour	NC	NC	NC	NC
2.	Odour	NC	NC	NC	NC
3.	Taste	NC	NC	NC	NC
4.	Turbidity	X	X	X	X
5.	Homogeneity	Y	Y	Y	Y
6.	Viscosity (millipoise)	5.60	5.70	5.61	5.63
7.	Total solid content (% w/v)	42	42.58	41.89	42.49
8.	Specific gravity at 25°C (g/ml)	1.20	1.18	1.18	1.18
9.	Total acidity (%v/v) titrimetric method	0.047	0.047	0.047	0.047
10.	Refractive index at room temperature	1.346	1.346	1.346	1.346
11.	Reducing sugar (%v/v) titrimetric method	2.94	2.94	2.94	2.94
12.	Non reducing sugar (%v/v) titrimetric method	5.56	5.56	5.56	5.56
14.	Total sugar (%v/v) titrimetric method	8.45	8.45	8.45	8.45

NC- No change, X- No, Y- Yes

Table 8.31: Stability studies through physicochemical parameters of *trikantakadi kwath* syrup (after 6 months at 40°C ± 2°C/ 75%RH ± 5%)

S. No.	Parameters	Observed result			
		Batch (Syrup)			
		I	II	III	Mean value
1.	Colour	NC	NC	NC	NC
2.	Odour	NC	NC	NC	NC
3.	Taste	NC	NC	NC	NC
4.	Turbidity	X	X	X	X
5.	Homogeneity	Y	Y	Y	Y

RESULT AND DISCUSSION

6.	Viscosity (millipoise)	5.73	5.65	5.60	5.66
7.	Total solid content (% w/v)	43.5	41.98	41.82	42.46
		8			
8.	Specific gravity at 25°C (g/ml)	1.20	1.181	1.179	1.189
		8			
9.	Total acidity (%v/v) titrimetric method	0.04	0.048	0.048	0.048
		8			
10.	Refractive index at room temperature	1.34	1.346	1.346	1.346
		6			
11.	Reducing sugar (%v/v) titrimetric method	2.9	2.9	2.9	2.9
12.	Non reducing sugar (%v/v) titrimetric method	5.57	5.57	5.57	5.57
13.	Total sugar (%v/v) titrimetric method	8.45	8.45	8.45	8.45

NC- No change, X- No, Y- Yes

Interpretation

During the stability study various physicochemical parameters were done within the specific interval of time period and no significant variation has found in the results, when compared the observed value [Table 8.30, 8.31] with the previous data of *trikantakadi kwath* syrup. [Table 8.23].

8.7.3 Stability study of *trikantakadi* tincture for three days

Table 8.32: Stability studies through physicochemical parameters of *trikantakadi* tincture (after 24hr, 48hr, and 72hr at accelerated temperature conditions)

Sample code	Time duration (In hour)	Temp. (°C)	Physicochemical parameters								
			C	O	Ts	pH	Sp.	R	V	Tu	H
TA1	24 hr.	4°C	NC	NC	NC	4.76	1.00	1.34	1.3	X	Y
TA2		Room temp.	NC	NC	NC	4.76	1.00	1.34	1.3	X	Y

RESULT AND DISCUSSION

TA3		47°C	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TB1	48 hr.	4°C	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TB2		Room temp	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TB3		47°C	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TC1	72 hr.	4°C	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TC2		Room temp	NC	NC	NC	4.76	1.00	1.34 2	1.3	X	Y
TC3		47°C	NC	NC	NC	4.76	1.00	1.34 2	1.4	X	Y

C- Colour, O- Odour, Ts- Taste, Sp.- Specific gravity at room temperature (g/ml), R- Refractive index at room temperature, V- Viscosity

(millipoise), Tu- Turbidity, H- Homogeneity, T- Tincture, NC- No change, X- No, Y- Yes

Interpretation

Stability studies through physicochemical parameters of *trikantakadi* tincture (after 24hr, 48hr, and 72hr at accelerated temperature conditions) was done within the specific interval of time period & no significant variation has found in the results, when compared the observed value [Table 8.32] with the previous data of *trikantakadi* tincture. [Table 8.24].

8.7.4 Stability study of *trikantakadi* tincture for six months

Table 8.33: Stability studies through physicochemical parameters of *trikantakadi* tincture (0 day)

S. No.	Parameters	Observed result			
		Batch (Tincture)			
		I	II	III	Mean value
1.	Colour	NC	NC	NC	NC
2.	Odour	NC	NC	NC	NC
3.	Taste	NC	NC	NC	NC
4.	Turbidity	X	X	X	X
5.	Homogeneity	Y	Y	Y	Y

RESULT AND DISCUSSION

6.	Viscosity (millipoise)	1.39	1.36	1.39	1.38
7.	Total solid content (% w/v)	3	3	3.5	3.16
8.	Specific gravity at 25°C (g/ml)	1.002	1.004	1.003	1.003
9.	Total acidity (%v/v) titrimetric method	0.027	0.028	0.027	0.027
10.	Refractive index at room temperature	1.342	1.342	1.342	1.342
11.	Alcohol content (% v/v)	3	3	3	3
12.	pH	4.76	4.76	4.76	4.76
13.	Test for methanol	-ve	-ve	-ve	-ve

NC- No change, X- No, Y- Yes, -ve- absent

Table 8.34: Stability studies through physicochemical parameters of *trikantakadi* tincture (after 6 months at 40°C ± 2°C/ 75%RH ± 5%)

S. No.	Parameters	Observed result			
		Batch (Tincture)			
		I	II	III	Mean value
1.	Colour	NC	NC	NC	NC
2.	Odour	NC	NC	NC	NC
3.	Taste	NC	NC	NC	NC
4.	Turbidity	X	X	X	X
5.	Homogeneity	Y	Y	Y	Y
6.	Viscosity (millipoise)	1.36	1.39	1.39	1.38
7.	Total solid content (% w/v)	3.5	3.4	3.4	3.5
8.	Specific gravity at 25°C (g/ml)	1.003	1.004	1.004	1.003
9.	Total acidity (%v/v) titrimetric method	0.047	0.047	0.047	0.047
10.	Refractive index at room temperature	1.342	1.342	1.342	1.342
11.	Alcohol content (% v/v)	3	3	3	3
12.	pH	4.76	4.76	4.76	4.76
13.	Test for methanol	-ve	-ve	-ve	-ve

NC- No change, X- No, Y- Yes, -ve- absent

Interpretation

During the stability study various physicochemical parameters were done within the specific interval of time period and no significant variation has found in the results, when compared the

RESULT AND DISCUSSION

observed value [Table 8.33, 8.34] with the previous value of *trikantakadi* tincture. [Table 8.24]

8.7.5 Stability study of *trikantakadi kwath ghana*, *trikantakadi kwath ghana* with excipient and *trikantakadi kwath ghana vati* for 30 days

Table 8.35: Result of analytical stability parameters of *trikantakadi kwath ghana* and *trikantakadi kwath ghana* with excipient (After 15 days at 40°C ± 2°C/ 75%RH ± 5%)

S.No	Parameters	R1	R2	R3	Avg.	Re1	Re2	Re3	Avg.
1.	Bulk density	0.66	0.66	0.66	0.66	0.33	0.34	0.34	0.33
2.	Tapped density	0.76	0.75	0.76	0.76	0.40	0.40	0.40	0.40
3.	Compressibility index	13.15	13.14	13.15	13.1	17.5	17.4	17.4	17.4
4.	Angle of repose	19.44	19.50	20.80	19.65	21.80	22.07	24.22	22.69

R1- R3; Raw herbs powder, Re1- Re3; Raw herbs with excipient, Avg; Average

Table 8.36: Result of analytical stability parameters of *trikantakadi kwath ghana* and *trikantakadi kwath ghana* with excipient (After 20 days at 40°C ± 2°C/ 75%RH ± 5%)

S.No	Parameters	R1	R2	R3	Avg.	Re1	Re2	Re3	Avg.
1.	Bulk density	0.66	0.65	0.66	0.65	0.32	0.34	0.36	0.34
2.	Tapped density	0.76	0.76	0.75	0.76	0.40	0.40	0.40	0.40
3.	Compressibility index	14.47	14.46	14.46	14.46	15	15.1	15.1	15.06
4.	Angle of repose	19.44	19.80	20.80	20.01	21.80	23.02	24.22	23.01

R1- R3; Raw herbs powder, Re1- Re3; Raw herbs with excipient, Avg; Average

Table 8.37: Result of analytical stability parameters of *trikantakadi kwath ghana* and *trikantakadi kwath ghana* with excipient (After 30 days at 40°C ± 2°C/ 75%RH ± 5%)

S.No	Parameters	R1	R2	R3	Avg.	Re1	Re2	Re3	Avg.
1.	Bulk density	0.66	0.66	0.66	0.66	0.34	0.34	0.33	0.33
2.	Tapped density	0.76	0.76	0.75	0.76	0.40	0.40	0.40	0.40
3.	Compressibility index	13.15	13.14	13.15	13.1	17.4	17.5	17.4	17.4
4.	Angle of repose	18.44	19.45	20.50	19.46	21.01	24.02	24.22	23.08

R1- R3; Raw herbs powder, Re1- Re3; Raw herbs with excipient, Avg; Average

Interpretation

Stability studies through physicochemical parameters of *trikantakadi kwath ghana* powder and

RESULT AND DISCUSSION

trikantakadi kwath ghana powder with excipient (after 15, 20 & 30 days at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}/75\%\text{RH} \pm 5\%$) does not showed any type of variation when compared the observed value [Table 8.35-8.37] with the previous value of *trikantakadi kwath ghana* powder and *trikantakadi kwath ghana* powder with excipient. [Table 8.25].

Table 8.38: Result of analytical stability parameters of *trikantakadi kwath ghana vati* (After 15, 20 & 30 days at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}/75\%\text{RH} \pm 5\%$)

S.No.	Parameters	Observed result		
		After 15 day	After 20 day	After 30 day
1.	Appearance	Whitish cream	Whitish cream	Whitish cream
2.	Shape	Round	Round	Round
3.	Hardness	4 kg/inch ²	4kg/inch ²	4kg/inch ²
4.	Thickness and diameter	4 mm, 10.3 mm	4 mm, 10.3 mm	4 mm, 10.3 mm
5.	Friability	0.20%w/w	0.20% w/w	0.20% w/w
6.	Weight variation	1.8 %w/w	1.7 %w/w	1.8 %w/w
7.	Disintegration time	18 minute	18 minute	18 minute
8.	Disintegration time (at 28- 32 rpm)	99.63% drug release in 2 hr	99.26 % drug release in 2 hr	99.63% drug release in 2 hr
9.	Assay	99.89%	99.89%	99.89%




Hr; Hours, min; minutes

Interpretation

Stability studies through physicochemical parameters of *trikantakadi kwath ghana vati* (after 15, 20 & 30 days at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}/75\%\text{RH} \pm 5\%$) does not showed any type of variation when compared the observed value [Table 8.38] with the previous data of *trikantakadi kwath ghana vati*. [Table 8.26].

RESULT AND DISCUSSION

Table 8.39: Organoleptic characters of *trikantakadi kwath* syrup (after 6 months of stability time period), *trikantakadi* tincture (after 6 months of stability time period), *trikantakadi kwath ghana vati* (after 30 days of stability time period)

S. No.	Parameters	TKS	TT	TKGV
1.	State:	Liquid	Liquid	Solid
2.	Colour:	Dark brown	Brown	Creamish white
3.	Odour:	Brown	Alcoholic fragrance	Characteristics
4.	Taste:	<i>Madhura, tikta</i>	<i>Kashya, tikta</i>	<i>Kashaya</i>
		 Figure 8.71	 Figure 8.72	 Figure 8.73

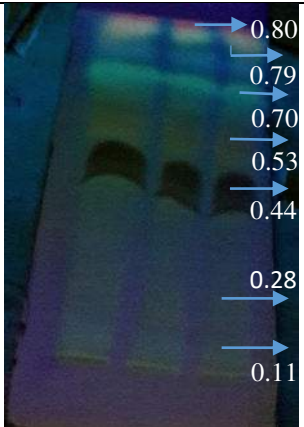
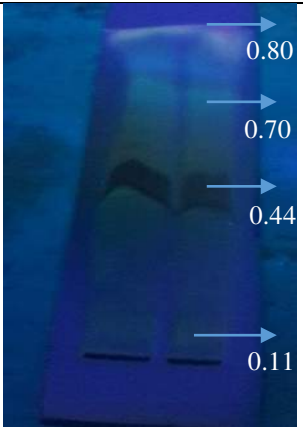
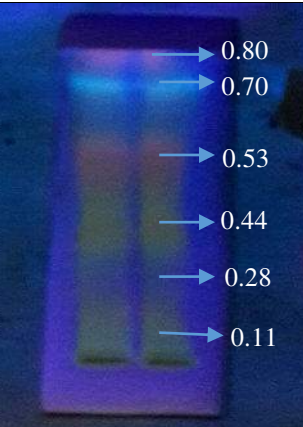
Interpretation

After stability studies the organoleptic characters of *trikantakadi kwath* syrup, *trikantakadi* tincture, *trikantakadi kwath ghana vati* does not shows any variation. [Table 8.39].

RESULT AND DISCUSSION

8.7.6 TLC Profile

Table 8.40: TLC profiling of the *trikantakadi kwath* syrup (after 6 months of stability time period), *trikantakadi* tincture (after 6 months of stability time period), *trikantakadi kwath ghana vati* (after 30 days of stability time period).

Mobile phase- Ethyl acetate: Methanol: Ethanol: Water (81:11:4:8) Stationary phase- Silica gel G Extract used for spotting: Methanolic extract (No spots observed under visible light)			
	Figure 8.74	Figure 8.75	Figure 8.76
	Observed R_f value under 365 nm: 0.11, 0.28, 0.44, 0.53, 0.70, 0.79, 0.80	Observed R_f value under 365 nm: 0.11, 0.44, 0.70, 0.80	Observed R_f value under 365 nm: 0.11, 0.28, 0.44, 0.53, 0.70, 0.80

Interpretation

After the completion of stability study the Thin Layer Chromatography study of TKS, TT and TKGv were done. There was no significant difference or variation found in the results.

RESULT AND DISCUSSION

8.7.7 Phytochemical investigation of the prepared dosage forms (after the completion of stability time period)

Table 8.41: Depicting phytochemical investigation of the prepared dosage forms (after the completion of stability time period)

S. No.	Chemical constituents	Test	TKS (after 6 month)	TT (after 6 month)	TKGV (after 30 days)
1.	Alkaloid	Mayer's reagent	+	+	+
		Dragendroff's reagent	+	+	+
		Wagner's reagent	+	+	+
2.	Tannin	Ferric chloride test	+	+	+
		Lead acetate test	+	+	+
3.	Anthraquinone glycoside	Borntrager's test	+	+	+
4.	Sterol/ Steroids	Legal test	+	+	+
		Killer- killani test	+	+	+
		Salkowaski test	+	+	+
5.	Flavonoids	Shinoda test	+	+	+
6.	Test for terpenoids	Libermann- burchard's test	+	+	+
		Salkowaski test	-	-	-
7.	Reducing sugar	Benedict test	-	+	NA
		Fehling test	-	+	NA
8.	Non reducing sugar	Benedict test	+	-	NA
		Fehling test	+	-	NA

+ (Present), - (Absent), NA- Not applicable

Interpretation

After the completion of stability study the phytochemical analysis of TKS, TT and TKGV were done. There was no significant difference or variation found in the results.

RESULT AND DISCUSSION

Table 8.42: Wavelength and calibration curve data of *trikantakadi kwath*

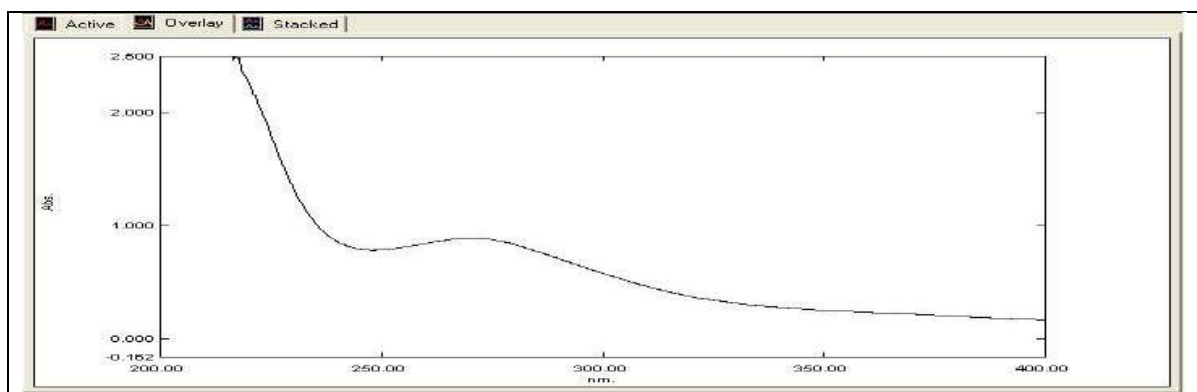


Figure 8.77 Wavelength of *trikantakadi kwath*

S.NO.	Concentration (µg/ml)	Absorbance
1.	0	0
2.	50	0.171
3.	100	0.297
4.	200	0.577
5.	300	0.838
6.	400	1.178
7.	500	1.393

Table 8.42a: Calibration curve data of *trikantakadi kwath*

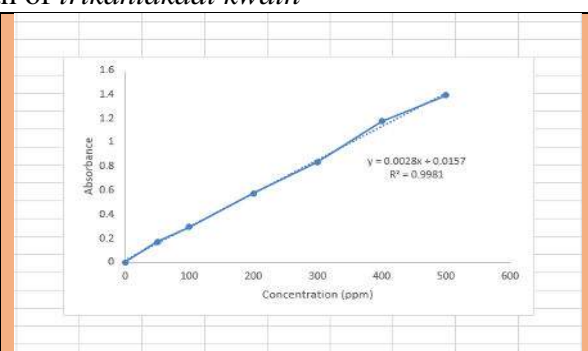


Figure 8.78: Calibration curve of *trikantakadi kwath* (261nm)

Interpretation: Wave length of TK came at the 261 nm

Table 8.43: Dissolution % drug release data of *trikantakadi kwath ghana vati* (III batch) at 261 nm.

S.NO.	Time (minute)	% drug release
1.	0	0
2.	5	33
3.	10	34
4.	15	43
5.	30	45
6.	45	48
7.	60	51
8.	90	71
9.	120	91

Table 8.43a: Dissolution % drug release data of *trikantakadi kwath ghana vati* (III batch)

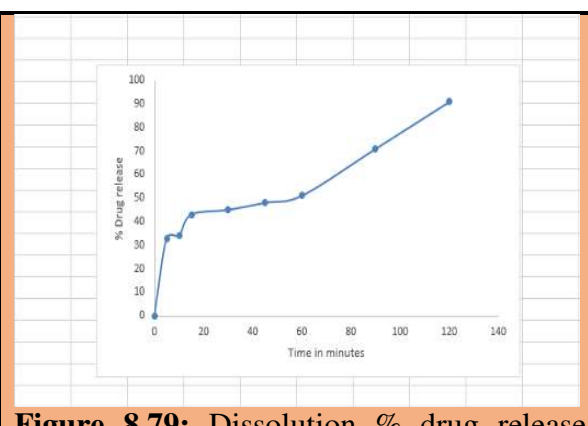


Figure 8.79: Dissolution % drug release graph of *trikantakadi kwath ghana vati* (III batch)

Interpretation: Dissolution % drug release of III batch of TKGV showed 91% drug release in 2 hr.

RESULT AND DISCUSSION

Table 8.44: Comparison of dissolution % drug release data of *trikantakadi kwath ghana vati* (IV batch at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ / $75\% \text{RH} \pm 5\%$) during stability with the previous dissolution % drug release at 261nm

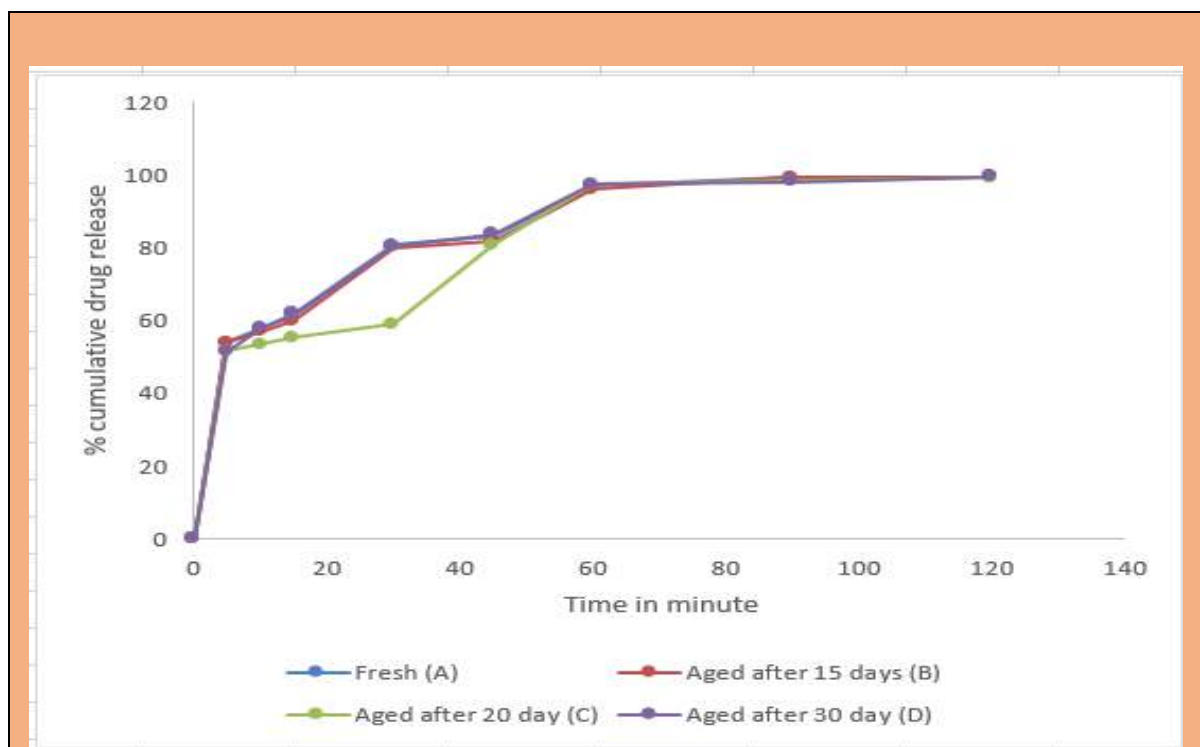


Figure 8.80: % cumulative drug release data of *trikantakadi kwath ghana vati* (IV batch)

Time in minute	Percentage drug release of drug (%)				Value					
	Fresh (A)	Aged after 15 days (B)	Aged after 20 days (C)	Aged after 30 days (D)	A/B		A/C		A/D	
					F ₂	P	F ₂	P	F ₂	P
0	0	0	0	0						
5	53.87	54	51.66	51.29	77.17	0.97	67.39	0.79	74.89	0.98
10	57.56	57	53.35	57.93						
15	61.99	60	55.35	61.62						
30	80.81	80	59.04	80.44						

RESULT AND DISCUSSION

45	83.02	82	80.81	83.76						
60	97.04	96	97.41	97.41						
90	99.26	99.26	98.52	98.15						
120	99.28	99.63	99.26	99.63						

Table 8.44a: Comparison of dissolution % drug release data of *trikantakadi kwath ghana vati* (IV batch) showed that $F_2 > 50$ (means resemble with similar dissolution profile), $P > 0.05$ (means non-significant changes)

Interpretation

Dissolution profile of IV batch showed $F_2 > 50$ and $P > 0.05$ that means value resemble with similar dissolution profile and showed non-significant variation in the data.

Table 8.45 Sugar estimation plot of *trikantakadi kwath* syrup

Concentration (ppm)	Absorbance
10	0.007
20	0.008
30	0.013
40	0.022
50	0.023

Table 8.45a: Sugar estimation data of *trikantakadi kwath* syrup

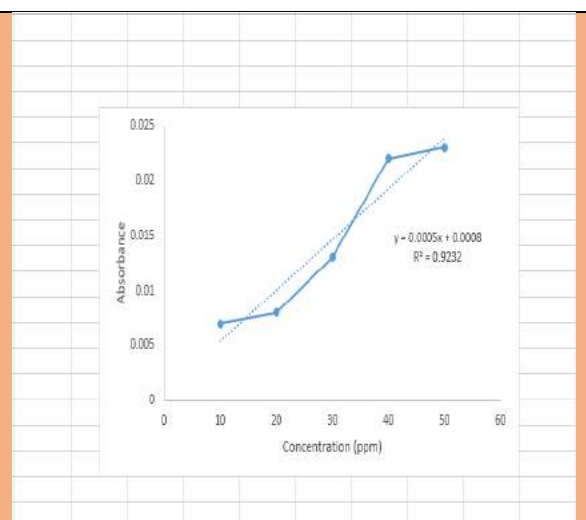









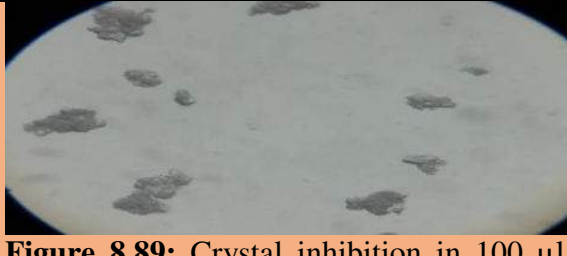

Figure 8.81 Sugar estimation graph of *trikantakadi kwath* syrup

Interpretation

Sugar estimation profile showed that in 10ppm contain 8.4 % of sugar and 50ppm contain 44.4 % of sugar content.

8.8 In vitro study

Table 8.46: *In vitro* microscopic studies of formulations

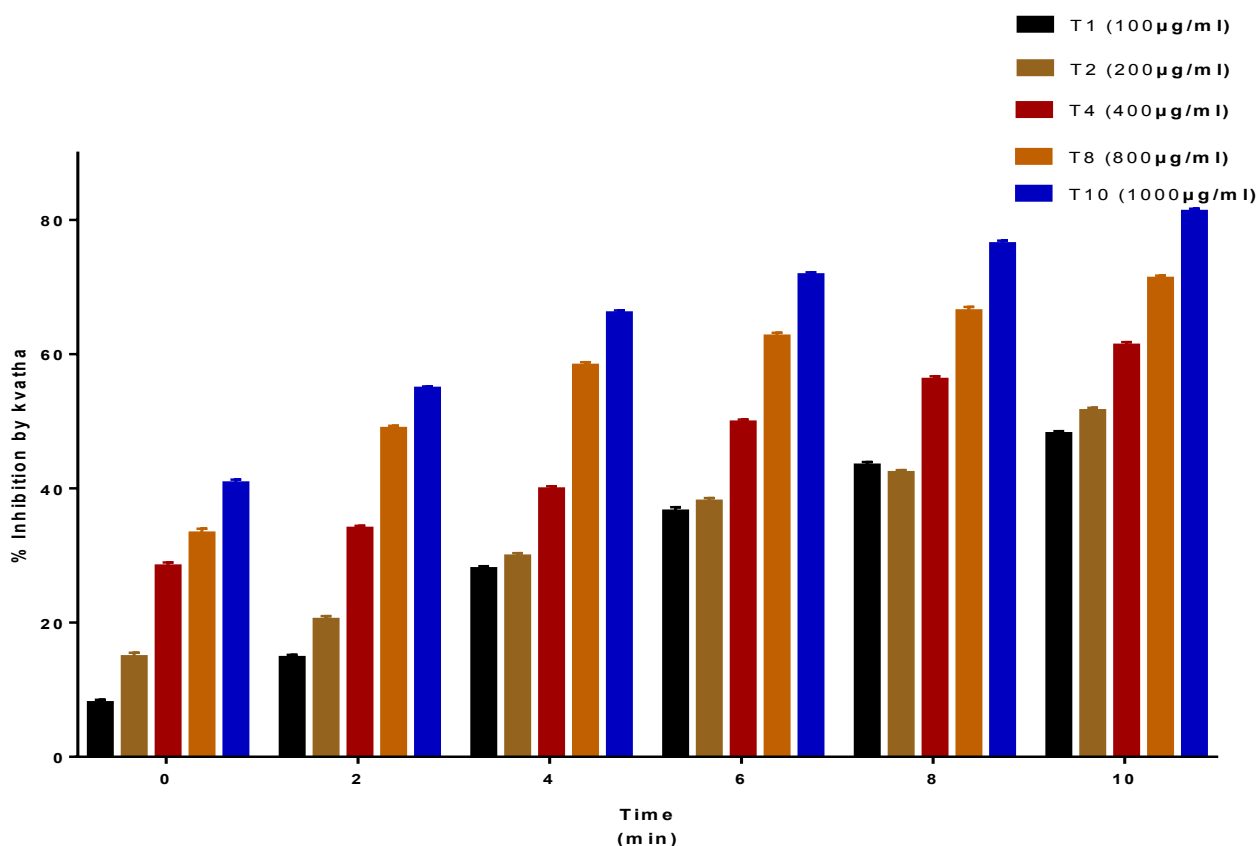
	
<p>Figure 8.82: Crystal growth in artificial urine preparation</p>	
	
<p>Figure 8.83: Crystal inhibition in 100 µl prepared drug sample of TK</p>	<p>Figure 8.84: Crystal inhibition in 1000 µl prepared drug sample of TK</p>
	
<p>Figure 8.85: Crystal inhibition in 100 µl prepared drug sample of TKG</p>	<p>Figure 8.86: Crystal inhibition in 1000 µl prepared drug sample of TKG</p>
	
<p>Figure 8.87: Crystal inhibition in 100 µl prepared drug sample of TKS</p>	<p>Figure 8.88: Crystal inhibition in 1000 µl prepared drug sample of TKS</p>
	
<p>Figure 8.89: Crystal inhibition in 100 µl prepared drug sample of TT</p>	<p>Figure 8.90: Crystal inhibition in 1000 µl prepared drug sample of TT</p>

RESULT AND DISCUSSION

Interpretation

In vitro microscopic studies showed that all dosage form dissolved the calcium oxalate crystals. TK showed maximum effect as compare to other dosage form. The decreasing order of dissolution rate of drug are TK>TKGV>TKS>TT.

Graph 8.1: Showing % inhibition of TK with respect to time

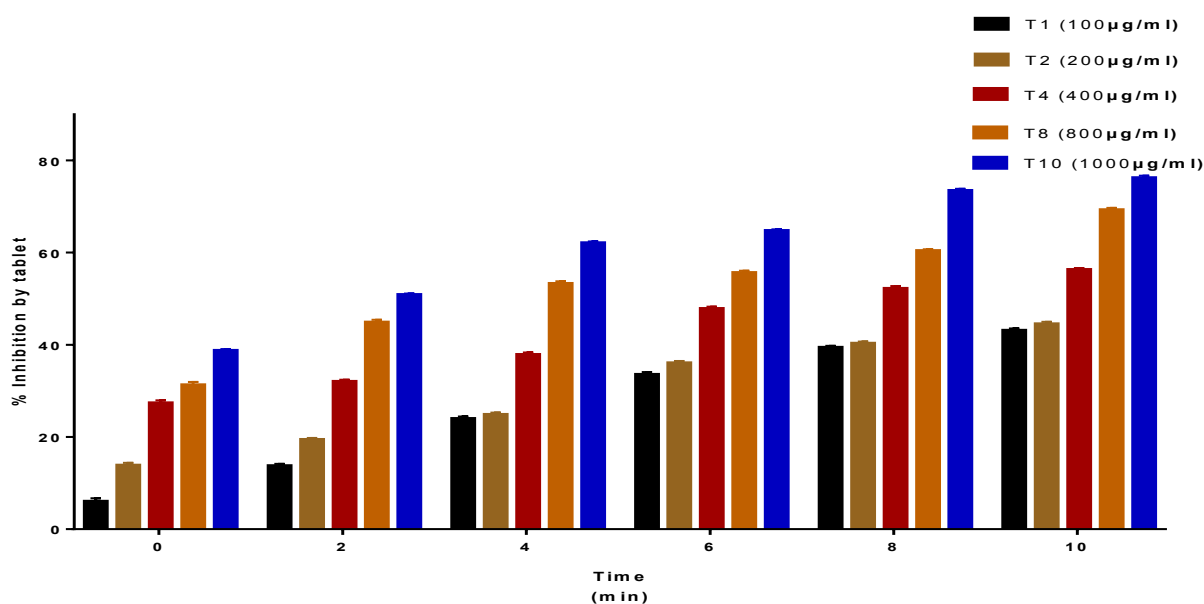


Interpretation

The graph predicts that the samples of TK started giving inhibition from 0 minutes. With increase in time the % inhibition also changed accordingly. The last concentrations (1000 µg/ml) showed 81.25% inhibition.

RESULT AND DISCUSSION

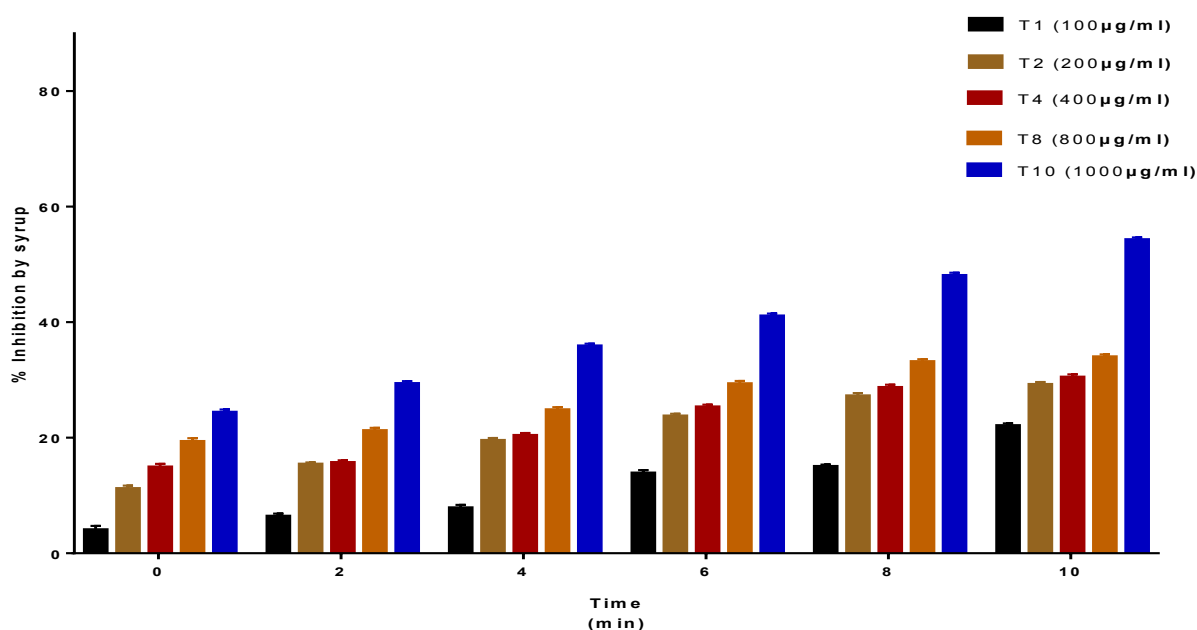
Graph 8.2: Showing % inhibition of TKGV with respect to time



Interpretation

The graph predicts that the samples of TKGV started giving inhibition from 0 minutes. With increase in time the % inhibition also changed accordingly. The last concentrations (1000 µg/ml) showed 76.25% inhibition.

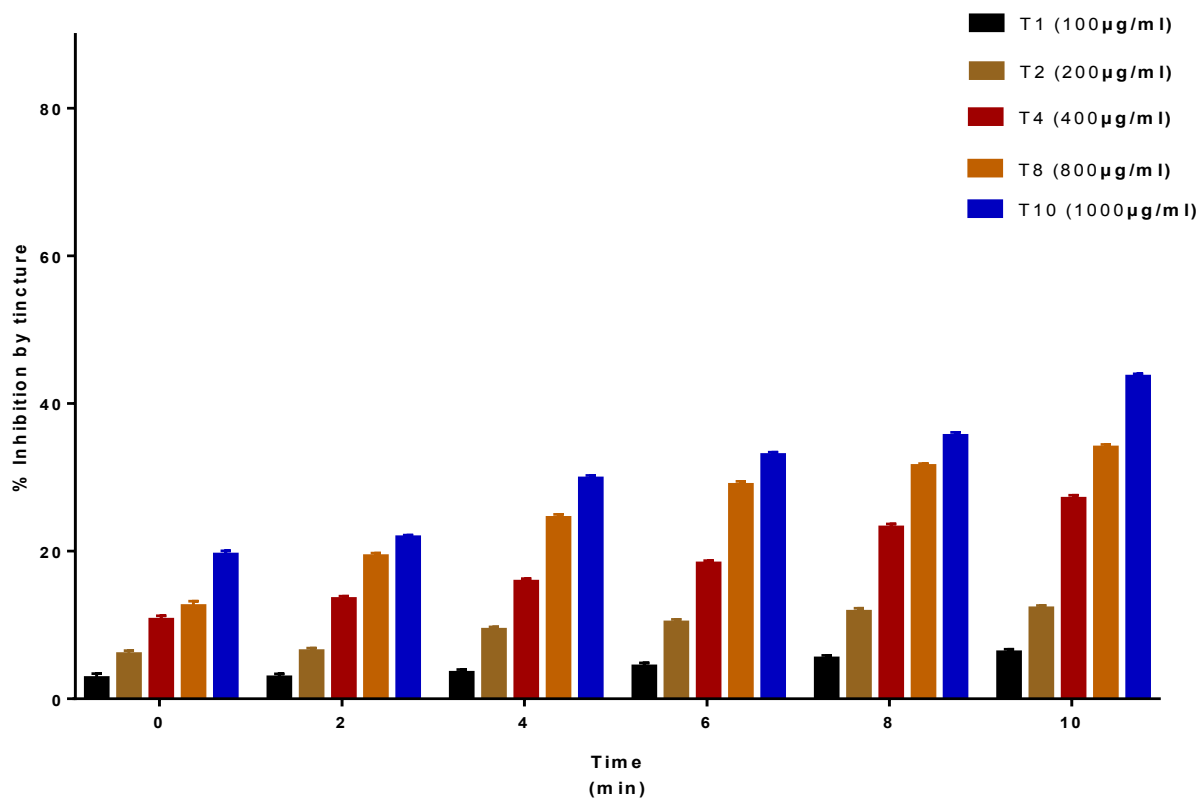
Graph 8.3: Showing % inhibition of TKS with respect to time



RESULT AND DISCUSSION

Interpretation The graph predicts that the samples of TKS started giving inhibition from 0 minutes. With increase in time the % inhibition also changed accordingly. The last concentrations (1000 µg/ml) showed 54.26% inhibition.

Graph 8.4: Showing % inhibition of TT with respect to time



Interpretation

The graph predicts that the samples of TT started giving inhibition from 0 minutes. With increase in time the % inhibition also changed accordingly. The last concentrations (1000 µg/ml) showed 43.61% inhibition.

9. CONCLUSION AND FUTURE SCOPE

CONCLUSION AND FUTURE SCOPE

CHAPTER 9

CONCLUSION AND FUTURE SCOPE

Mutrakrichha (dysuria) is a misbalanced condition in which urine is expelled out in small quantity with pain and difficulty in urination. *Mutrakrichha* is the main causative factors for the generation of all type of kidney stone. *Ashmari* (urolithiasis) is categorized under 8 *maharogas* by *Acharya Shushruta*. Urolithiasis also known as *mutra-ashmari* refers to the disease which is characterized by the formation of hard calcified masses that are formed in the urinary tract, the severe cases of urolithiasis can disturb the normal physiology and anatomy of urinary system. *Trikantakadi kwath* is one of the polyherbal classical preparation mentioned in *Ayurveda Sara Samgraha* and indicated for the treatment of *ashmari*, *mutraghat*, *mutrakricha* and to remove the kidney stone outside the body. The demerits of *kwath* are stability, shelf life, non- convenient, large dosages administration, to overcome the problem with the *kwath* dosage form an effort is made for the modification in the formulation without changing its efficacy and with the implication of new techniques various dosages form such as tablet, syrup, and tincture were prepared.

The development process started from the procurement, authentication and standardization of raw materials. Pharmacognostic, physicochemical and phytochemical results were compared with the standard values to check the identity, purity and strength of the prepared sample. The preparation of *trikantakadi kwath* was done according to the classical method and prepared *trikantakadi kwath* used as base for converted dosage form with various concentration of watery portion as per the requirements.

Pharmacognostic, physicochemical, phytochemical parameters of all the raw ingredients and formulations were studied, it showed that all the chemical compound that were present in the *Kwath* (TK) were also present in other prepared dosage form. Stability study of various prepared dosage forms of *trikantakadi kwath* was done for the time period of three days, thirty days and six months. During the stability study the various physicochemical phytochemical and Thin Layer Chromatography studies were done within the specific interval of time. Stability studies showed no significant variation when compared the observed results of accelerated temperature condition data with the previous data.

Dissolution studies were carried out for fresh and aged sample of prepared TKG (IV batch) at $40^{\circ}\text{C} \pm 2^{\circ}\text{C} / 75\% \text{RH} \pm 5\%$ for the time periods of one month. The results of dissolution

CONCLUSION AND FUTURE SCOPE

profiles indicated that TKGV were unaffected by ageing. The non- significant difference ($P > 0.05$) was observed in dissolution rates of aged TKGV when compared to those of TKGV not subjected to accelerated stability testing. P value 0.97, 0.79 and 0.98 were found which were greater than 0.05. Similarity factor (F_2) 77.17, 67.39 and 74.8 which were greater than 50. During the *in- vitro* studies when sodium oxalate mixed with prepared sample of urine, crystal of sodium oxalate were observed under microscope. After the addition of drugs these crystals were found decreased which showed that the drugs is helpful in breaking crystals. The decreasing order of dissolution rate of drug are $TK > TKGV > TKS > TT$. The 81.25%, 76.25%, 54.26% and 43.61% of drugs inhibittance were found in 1000 μ l of TK, TKGV, TKS and TT respectively when observed under the UV. Physicochemical comparative studies of all the liquid dosage form showed that, pH, Specific gravity, Refractive index of all the prepared liquid dosage form were nearly the same. Percentage of Total solid content of TT was lower as compared to the TKS (due to addition of 50% sugar solution in it). Viscosity & Total acidity of TKS were higher than the TT.

After performing physicochemical, phytochemical studies of TK and its prepared dosage form non- significant variation were observed in the result and again during the same is persist after checking the stability data of all prepared dosage form. *In vitro* dissolution study of TKGV showed non- significant variation when compared the observed value of stability data with the previous dissolution data. *In vitro* antiurolethic activity of TKGV showed good result to dissolve the kidney stone as compare to other prepared formulations. From the overall study we concluded that it is possible to make it's another dosage form for which can be proven more convenient and compliance to the consumers. So shelf life and all other related issue of *Kwath* may be solve by converting *Kwath* into most convenient dosage form as per requirement. But the errors are possible because it is not possible in short period of time, to perform experiment again and again for the reproducibility of the result. But in short period of time I was done all the parameters carefully under the guidance of our guide and results are concluded.

Future scope: This study was planned to get the preliminary information about the standardization, preparation of different dosage form, stability and antiurolethic activity of *trikantakadi kwath* and its prepared dosage form. The present study deciphered that TKGV has shown best result among the various prepared dosage forms. Moreover, the obtained results of dosage forms prepared by using TK have shown promising antiurolethic activity

CONCLUSION AND FUTURE SCOPE

during their *in-vitro* testing. Hence, it could be concluded that the prepared formulation could be able to provide better antiurolethic activity when administered to patients suffering from kidney stones, however, the obtained results need to be correlated with *in vivo* study to be carried out in future using suitable animal model.

10. REFERENCES

CHAPTER 10

REFERENCES

1. http://nccam.nih.gov/sites/nccam.nih.gov/files/D287_BKG-date15/9/2016
2. Ayurvedacharya Indramohan J.S., Vavyavharayurveda- Vijyan Medical Jurisprudence, Chaukhamba Sanskrit Pratisthana.
3. Prof. Ranade S., Dr. Rajendra Deshpande, History and Philosophy of Ayurveda, Ist edition, International Academy of Ayurveda Pune, India; 1998. P.3- 25
4. <http://www.jaim.in/article.asp?issn=0975-date17/10/2016>.
5. <http://www.medscape.com/viewarticle/521366-date20/10/2016>
6. <http://www.medicinenet.com/script/main/art.asp?articlekey=6649-date25/10/2016>
7. Lyanda F., Treatment and Prevention of kidney Stones, University of California School of Medicine, San Francisco, California.
8. Diet for Kidney Stone Prevention, National Kidney and Urologic Diseases Information Clearing House, National Institute of Diabetes, Digestive and Kidney Diseases 2003; P.13-64.
9. Shubhashree M.N.*¹, Doddamani S.H.², Giri S.K.², Triveni D.P.³, Sulochana Bhat⁴, Ayurvedic Management of Paediatric Urolithiasis (Mutrashmari). A Case Report, International Journal of Research in Ayurveda and Pharmacy 2017; P. 3-5
10. From the book Urology care, Foundation TM the official foundation at the American Urological Association.
11. Sushruta, Sushruta Samhita, Chi. Sth. 7/3, Nyayachandrika panjika by Vaidya Yadavaji Tirkam ji, Chaukhamba Sanskrita Santhana, Varanasi; 1997.P.435
12. Sharma V.R.N., Ayurveda Sar Samghara, Reprint 11th edition, Vaidyanatha Ayurved Bhavan, Kolkata; 2011.P.707
13. Mehta R. M., Dispensing Pharmacy. Pharmaceutics- II. Vallabh Prakashan, Delhi; 2011.P.154
14. <https://theherbarium.wordpress.com/2009/02/01/tinctures-fluid-extracts/-Tincture> and Fluid Extracts/ the Herbarium 20/9/2016.
15. Gennaro A.R., Remington: The Science & Practice of Pharmacy volume Lippin cott Williams and Wilkins, International Student edition 2001; P.359
16. <http://www.phytojournal.com/vol2Issue5/11.1.html>
17. [http://rjptonline.Org/RJPT_%20VolII\(4\)/3](http://rjptonline.Org/RJPT_%20VolII(4)/3).

REFERENCES

18. http://www.polyu.edu.hk/abct/skltem/Symposium/en/abstract/abstract_che20/09/2016.
19. <http://www.ijptonline.com/wp-content/uploads>
20. Satheesh Madhavi NN, Upadhy K., Bishti A, phytochemical Screening and Standardization of Poly Herbal Formulation for Dyslipidemia, Indian Journal of Physiology and Pharmacology
21. <http://www.ijptonline.com/wp-content/uploads/2013/08/2509-2519>
22. Anonymous. The Ayurvedic Pharmacopoeia of India, Part I, 2st edition Government of India, Ministry of Health and Family Welfare Department of Ayush, Delhi; 2008.P.165.
23. Op. Cit. (22): Part I, P.2
24. Anonymous. The Ayurvedic formulary of India, Part-I, Volume 2, Government of India Ministry of Health and Family Welfare Department of Ayush; 2008.
25. Mehta A.K., Sharma R.: Ayurvedic Pharmacy Bhaishajya- Kalpana. Chaukhamba Sanskrit pratishthan, Delhi; P.112.
26. Prasad P.V.N.R., Bhaishajya Kalpana Vijnana. 1th edition, Chowkhamba Krishnadas Academy, Varanasi; 2008.P.143-144
27. Agnivesha, Charaka Samhita, Su. Sth. 4/6, Revised by Sri Satya Narayana Shastri, Chaukhamba Bharti Academy, Varanasi; 2006.P.67-68
28. Sushruta.Sushruta Samhita. Chi. Sth. 31/8. Chaukhambha Sanskrit Sansthan Varanasi; 2005.P.134
29. Tripathi R.D., Astanga Samgraha, Su. Sth. 178/103, Chaukhamba Sanskrit Pratisthan, Delhi; 2003.P.178
30. Pandit Sarangadhara, Sarangadhara Samhita, Md. Kh. 2/3, Commentary by Dr. Brahmanand Tripathi, Chaukhamba Surbharti Prakshana, Varanasi; 2010.P.133-134
31. Jha C., Yogtarangini, 76/10, Commentary by Shri. Datt Ram Mathur, Chaukhamba Vidyabhavan, Varanasi; 2003.P.76
32. Vitthal K.D., Vridhasavarishtasamgraha, Chaukhamba Sanskrit Pratisthana, Delhi; 1990.P.55-56.
33. Op. cit. (12) p.707
34. Vaidya L., Yogratnakar, Reprint edition, Chaukhambha Sanskruta Samsthana, Varanasi; 2002.P.120-121
35. Sharma PV, Dravyaguna vigyana, Vol-II, Chaukhambha bhartiya academy, Varanasi; 2012.P.349

REFERENCES

36. Vaidya Jaymini Pandey, Harita Samhita, Reprint edition, Chaukambha Visvabhati, Varanasi; P.187
37. Op. cit. (12) p.707
38. Tiwari AK, Dwivedi N, Tripathi Manoj Kumar, Tripathi SP, Standardization and Quality Control of Darvyadi pravahi kvatha- An Ayurvedic Formulation, Indian Journal of Traditional Knowledge; 2016,15:(4), 654-658
39. Deepthi CP^{1*}, Basavaraj G. Y², Sreekanth G³, Rohit KS⁴, Anu PK⁴, Modification of Pancha Vidha Kashaya Kalpana; 2015,03:(05), 60-63
40. Vayas M, Shukla VJ, Patgiri BJ, Prajapati PK, A Unique Concentrated and Fermented Dosages Form i.e. Pravahi Kvatha, International Journal of Pharmaceutical and Biological Archives 2010;1:(3),287-290
41. Krishna G., Rasatantrasaar Va Sidhapryoga samghra Ist part, Krishna –gopal Ayurved bhavan, Ajmair; 2005.P.704.
42. Op. cit. (12) p.707
43. Op. cit. (35) P.632 634.
44. Godde P.S.D., Shankar Nighantu. Chaukhamba Vidyabhavan, Varanasi; 2002.P.154.
45. Sri Vagbhatacharya, Rasaratna Samuchchaya. 17/20, Commentary by Shri Kaviraj Ambikadatt Shastri. Chaukhamba Amarabharati Prakashan, Varanasi; 2003.P.311.
46. Sharma P.V., Priyanighantuh, 1/42-45, Commetry entitled ‘Padma’, Chaukhamba Surbharati Prakashan, Varanasi; 2004.P.13.
47. Divadi V., Raj Nighantu, Shatahavadi Varga /40. Commentary by Dr. Indradeva Tripathai Ayurvedacharya, Chaukhamba Krishnadaash Academy, Varanashi; 2006.P.69.
48. Vaidya B., Controversial Drugs in Indian Medicine, 2nd edition, Forwarded by P.V. Sharma, Chaukhambha orientalia, Varanasi; 2005.P.74.
49. Anonymous. The Ayurvedic Pharmacopoeia of India, Part I, Volume 1, Government of India Ministry of Health and Family Welfare Department of Ayush; 2008. P.51-52.
50. Op. cit. (35) P.636- 637.
51. Op. cit. (47) P.249.
52. Sharma P.V., Dhanvantri Nighantu. Karviradi varga/ 114- 116. Commentary by Dr. Guruprashad Sharma, Chaukhamba Orientalia, Varanasi; 2005.P.142.
53. Op. cit. (49) Part 1, Volume III,
54. Op. cit. (47) P.170- 173.
55. Op. cit. (44) P.10.

REFERENCES

56. Op. cit. (46) 1/215-216, P.14.
57. Op. cit. (52) P.55.
58. Vaisya R., Abhinava Buti Darpana, part II Chaukhamba Sanskrita P.28
59. Op. cit. (49) Part I, Volume V, P.9-10.
60. Op. cit. (35) P.579- 582.
61. Op. cit. (44) P.56.
62. Op. cit. (46) 3/73-76, P.88.
63. Op. cit. (47) P.251.
64. Op. cit. (49) Part 1, Volume III, P.47-48.
65. Op. cit. (35) P.316- 318.
66. Op. cit. (49) Part I, Volume II, P.188- 189.
67. Op. cit. (35) P.320.
68. Op. cit. (44) P.160.
69. Op. cit. (47) P.106.
70. Op. cit. (52) 44-45, P.24.
71. Op. cit. (49), Part I, Volume IV, P.96-97.
72. Op. cit. (35) P.650-652.
73. Op. cit. (44) P.160.
74. Op. cit. (46) 3/ 73-76, P.88
75. Op. cit. (47) P.112.
76. Op. cit. (48) P.3.
77. Op. cit. (58) P.151
78. Op. cit. (49) Part I, Volume I, P.120-121.
79. Op. cit. (35) P.753-758.
80. Op. cit. (47) P.384.
81. Op. cit. (52) P.53
82. Op. cit. (49) Monographs, P.62-63.
83. <https://easyayurveda.com/2013/10/24/kidney-stones-urinary-calculi-ayurveda-remedies-treatment-detail/dated:13/12/16,11:45am>
84. Dr. Smith, Urinary stones, Editor of General Urology, Chapter 15. 8th edition, California: LANGE medical publications; P.200- 216.
85. Agnivesha, Charaka Samhita, Su. Sth. 4/6, Revised by Sri Satya Narayana Shastri, Chaukhamba Bharti Academy, Varanasi; 2006.P.628- 632.

REFERENCES

86. Sushruta. Sushruta Samhita. Chi. Sth. 31/8. Commentary by Dr. Anant Ram Sharma, Chaukhambha Sanskrit Sansthan, Varanasi; 2005.P.628-632
87. Op. cit. (34) 17/1, p.99-100.
88. Sri Madhavakara, Madhavanidanam (Rog Viniscaya), Volume 1. 32/1-17, Commentary by Dr. Brahmananda Tripathi, Chaukhamba Surbharti Prakashan, Varanasi; 2005.P.639-641.
89. Op. cit. (34) P.50-61
90. Op. cit. (45) P.306- 307
91. Krishnamurthy K.H, Bhela Samhita, Commentary by Prof. Priya Vrat sharma, Chaukhamba visvabharti, Varanasi; 1999.P.371-372
92. Tiveri P., Kasyap Samhita, Chaukhamba Samskruta Samsthana; 2000.P.202- 206
93. Kumar V., Rog vijyan, 2nd part, Nath pustaka bhandara, Hariyana; P.168-170.
94. Mehta R.M., Dispencing Pharmacy. Pharmaceutics- II. Vallabh prakashan; 2011.P.154
95. <https://theherbarium.wordpress.com/2009/02/01/tinctures-fluid-extracts/-Tincture> and Fluid Extracts/ the Herbarium.
96. Gennaro A.R., Remington: The Science & Practice of Pharmacy, 22 edition, Lippin cott Williams and Wilkins. International student edition; 2001.P.359
97. <https://en.wikipedia.org/wiki/Tablet> (Pharmacy)
98. Mehta M., Dispencing Pharmacy, Pharmaceutics- II, Vallabh prakashan; 2011.P.247
99. Sharma R.N., Ayurveda Sar Samghara, Reprint 11th edition, Vaidyanatha Ayurved Bhavan; 2011.P.707
100. Kalsariya D., B.J. Patgiri and PK, Prajapati. Standar Manufacturing Procedure for Syrup and Tablet Forms of Jwarahara Dashemani, An International Quarterly Journal of Research in Ayurveda; 2010.P.255-259
101. <https://theherbarium.wordpress.com/2009/02/01/tinctures-fluid-extracts/-Tincture> and Fluid Extracts/ the Herbarium.
102. Todicherla V.K.S, Cherula M, Development of Formulation and Evaluation of Oral Disintegrating Tablets of Enalapril Maleate, International Journal of Pharma Tech Research, USA; 2013, 5(4), 1628-1639
103. Lohar Dr. D.R. Director, Protocol for Testing Ayurvedic, Siddha and Unani Medicin, Pharmacopoeial Laboratory for Indian Medicin Ghaziabad, Gov. of India, Ministry of Health and Family Welfare, Department of Ayush; P.49.

REFERENCES

104. Op. cit. (103) P. 49.
105. Op. cit. (103) P. 49.
106. Op. cit. (103) P. 50.
107. Op. cit. (103) P. 50.
108. Op. cit. (103) P. 50.
109. Op. cit. (103) P. 112.
110. Op. cit. (103) P.123.
111. Op. cit. (103) P.111.
112. Op. cit. (103) P.124.
113. Op. cit. (103) P.130.
114. <http://timesofindia.indiatimes.com/home/sunday-times/How-do-you-test-the-presence-of-methanol/articleshow/2929472.cms>
115. Krishnakanth B, Leena KB, Kumar K, Quality Control Tests for Tablets, Pharmaceutical Quality Assurance Concepts; 2010.P.6
116. Op. cit. (115) P.8.
117. Op. cit. (115) P.6.
118. Op. cit. (115) P.7.
119. Op. cit. (115) P.9.
120. Op. cit. (115) P.10.
121. Op. cit. (115) P.4-5.
122. Op. cit. (22) Part I, Volume VI, P.16
123. Chatwal G.R, Anand K. Sham, Instrumental Methods of chemical analysis (Analytical Chemistry) Himalaya Publishing House; P.2.5666-2.567.
124. Kumar. T. Larokar Y.K, Jain. V, Standardization of Different Marketed Brands of Ashokaristha, an Ayurvedic Formulation, Journal of Scientific and Innovative Research; 2013.P.993-998.
125. Op. cit. (103) P.50.
126. Dr. Kokate C K, Pharmacognosy volume-I and II, Forty seven edition, Nirali prakashan; P.3.2.
127. Geetha T.S. and Geetha N., Phytochemical Screening, Quantitative Analysis of Primory and Secondary Metabolites of Cymbopogan Citratus (DC) stapf. Leaves from kodaikanal hills, Tamilnadu; 2014.P.521-529.
128. Op. cit. (127)P.523

REFERENCES

129. Op. cit. (126) P.8.9.
130. Op. cit. (126) P.8.35.
131. Op. cit. (126) P.8.35.
132. Op. cit. (127) P.523
133. Op. cit. (126) P.9.1.
134. Op. cit. (126) P.523.
135. Op. cit. (126) P.7.5.
136. Op. cit. (126) P.7.21.
137. Kumar GP, Mittal A, Kumar R, Evaluation of *Tinospora cordifolia* for Antiurolithiatic Potential, *Journal of Pharmaceutical and Biomedical Sciences*; 2011.P.2
138. Kumar SP, Prasan ND. Development and Evaluation of Polyherbal Syrup from some Herbs used as Expectorant, *World Journal of Pharmacy and Pharmaceutical Sciences*; 2013
139. ICH Harmonised Tripartite Guideline, Stability Testing of New Drug Substances and Products Q1A (R₂), Current step 4 version; 6 February 2003
140. Carstensen et al, Stability Testing of Pharmaceutical Products, *Journal of Applied Pharmaceutics*; 2012.P.129-138

11. APPENDIX

CHAPTER 11

APPENDIX

11.1 Project/ Dissertation Topic Approval Performa

11.2 Certification of authentication of raw herbal material

11.3 Plagiarism report

11.4 Certificate and poster of “LPUNASYACON- 2016” conference

11.5 Certificate and poster of “ICP- 2017” conference

11.1 Project/ Dissertation Topic Approval Performa



TOPIC APPROVAL PERFORMA

LIT (Pharmacy)/Department of Pharmaceutical Sciences

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

COURSE CODE : APH623

REGULAR/BACKLOG : Regular

GROUP NUMBER : PHRRGD0030

Supervisor Name : Dileep Singh Baghel

UID : 15210

Designation : Associate Professor

Qualification : _____

Research Experience : _____

SR.NO.	NAME OF STUDENT	REGISTRATION NO	BATCH	SECTION	CONTACT NUMBER
1	Swati Sharma	11501536	2015	Y1553	9459766656

SPECIALIZATION AREA : Ayurvedic Pharmacy

Supervisor Signature: _____

PROPOSED TOPIC : Pharmaceutical standardization, dosage form development and comparative study with in vitro antiurolithic activity of Poly-herbal formulation Trikantakadi kwath

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	6.67
2	Project Feasibility: Project can be timely carried out in-house with low-cost and available resources in the University by the students.	6.67
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.	7.33
5	Social Applicability: Project work intends to solve a practical problem.	6.67
6	Future Scope: Project has potential to become basis of future research work, publication or patent.	6.67

PAC Committee Members		
PAC Member 1 Name: Dr. Amit Mittal	UID: 13145	Recommended (Y/N): Yes
PAC Member 2 Name: Saurabh Singh	UID: 12208	Recommended (Y/N): Yes
PAC Member 3 Name: Dr. S. Tamilvanan	UID: 16391	Recommended (Y/N): Yes
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 standardization, dosage form development and comparative study with In vitro antiurolithic activity of Poly-herbal formulation Trikantakadi kwath


Overall Remarks: Approved

PAC CHAIRPERSON Name: 11045::Dr. Monica Gulati

Approval Date: 25 Apr 2017

4/25/2017 4:09:05 PM

11.2 Certification of authentication of raw herbal material


ਬੈਟੈਨੀਕਲ 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. 1082 Sat. & Eve. Sec.
 Date: 13/11/16

To Whom It May Concern


The plant specimen(s) brought by Ms. Swati Shatwa - Regn. No 11501536
 student of M. Pharmacy (Ayurved) LPU Phagwara
LPU (Punjab)
 belongs to the following species.

1. Alhagi camelorum fabilioneaceae.
2. Betegenia ligulata saxifragaceae.
3. Cassia fistala caesalpinjiaceae.
4. Synodon dactylon Poaceae.
5. Fumetia varillanti fumeticeae.

Signature of Student _____
Swati Shatwa

Herbarium Assistant _____

Teachers Incharge [Signature]


 Head
 Dept. of Botanical &
 Environmental Sciences
 Guru Nanak Dev University
 Amritsar-143 005

6. Saccharum spontaneum
7. Poaceae.
8. Tribulus terrestris
zygophyllaceae.
9. Terminalia chobula
Combretaceae.

Phone: +91 183-2451048, PABX: 0183-2258802-09, 2450601-14 Extn. 3193, Fax: 0183-2258819-20 and 2255711
 Website: <http://www.gndu.dobos.org>, e-mail: gndu_botanical@hotmail.com

11.3 Plagiarism report

ORIGINALITY REPORT

%5	%4	%4	%2
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

11.4 Certificate and poster of "LPUNASYACON- 2016" conference





**LOVELY
PROFESSIONAL
UNIVERSITY**

Empowering Lives, Transforming India

AYURCEUTICALS: A PROGRESSIVE OPPORTUNITY IN WELLNESS AND MEDICAL TOURISM

Swati Sharma*, Dileep Singh Baghel**
School of Pharmaceutical Sciences, Lovely Professional University



National Ayurveda Doctors & Therapists Association
Nasya
Nasya - The Art of Life

Abstract

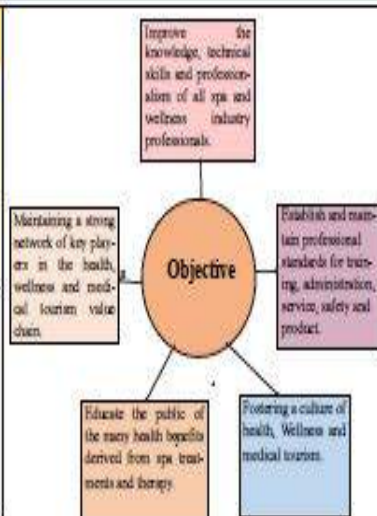
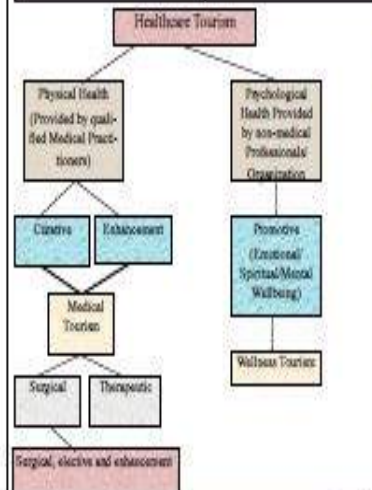
Wellness and Medical Tourism is an important economic activity and continues to be the fastest growing sector. It encompasses both medical tourism (based on western medicines) and wellness tourism (based on traditional therapies such as Ayurveda). The literature refers to medical tourism as the act of travelling to foreign countries to seek 'western-style' medicine treatments and procedures. Ayurveda has been the unique selling proposition (USP) of health tourism to offer a complete package of travel experiences with psychological, physical and spiritual wellbeing. Presently alternative therapy and herbal treatment is widely popular globally and makes India a major tourist attraction.

Keywords: Tourism, Medical, Wellness, Ayurveda

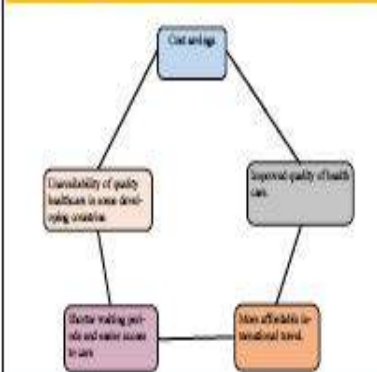
Introduction:

India was one of the first countries in Asia to recognize the export and import potential from medical and wellness tourism. Ayurvedicals are natural bioactive chemical compound that have health promoting, disease preventing and medicinal properties; play important role for the promotion of Health care Tourism.

MEDICAL TOURISM	WELLNESS TOURISM
Emphasis on cure	Emphasis on health promotion and diseases prevention.
Tourist travel because they want to treat/ cure a medical condition.	Tourist travel because they want to maintain or improve their health.



Influence the growth of wellness and medical tourism:-



Steps taken by Ministry of Tourism to promote Healthcare Tourism:

- Yoga/Ayurveda/Wellness/ Medical Tourism supported and promoted by the Ministry of Tourism's under 'Incredible India Campaign'.
- Guidelines for accreditation of Ayurvedic and Panchakarma Centres have been circulated to all State Governments for implementation.
- Ministry of Tourism circulate Brochures, CDs and other publicity materials to promote health care tourism.
- Medical Visa' facility are introduced.

Conclusion

Health care tourism is a booming as a tourism market. The main reason for the increasing popularity is the high cost of treatment, long waiting time, less insurance coverage in developed countries and the attitude of people to spend holidays in a quality manner with the aim of improving health in India.

References:

- N. Seikath and Ramesh Babu. Why go for Ayurveda? Food and Diet in Ayurveda", Life stream, 2012, 1(1): 29-32
- World Tourism Organization (UNWTO) report.
- www.incredibleindia.org
- Annual Report on Tourism Statistics (2012 – 2013) Department of Tourism, Government of India.



Platinum



Gold



Silver



Silver

11.5 Certificate and poster of "ICP- 2017" conference





AYURNUTRIGENOMICS: AN OVERVIEW

Swati Sharma*, Dileep Singh Baghel
LSPS, Lovely Professional University, Phagwara

*swati_govil@lpu.edu

DOI: 10.2196/2016

Code: B



Abstract

Ayurnutrigenomics means combination of Ayurveda, nutrition and genetics and elucidate the interaction between diet and genes. This new science focuses on how food affect our genes and can play an important role on disease treatment, prevention and mitigation through your nutrition. According to Ayurveda we all have different prakriti (i.e. Wind (vata), Choler (Pitta) and phlegm (Kapha) that reside in the body to help regulate its state. Ayurveda suggest food and natural drugs to reach a balance of these pathophysiological condition in each person. Ayurnutrigenomics involves the study of inter-individual variability due to genetic variability in humans for assessing susceptibility and establishing diagnosis and prognosis mainly on the basis of the constitution type of a person's prakriti. Personalized nutrition is a novel concept for developing personalized functional foods and nutraceuticals suitable for one's genetic makeup with the help of Ayurvedic concept. This review study aims to highlight the Ayurnutrigenomics in preventive, promoted, and personalized aspect of various ailments.

Keywords: Ayurnutrigenomics, Prakriti, Nutrition

Introduction

Introduction: Ayurvedic Genetics is concerned primarily with the balancing the biological factors (Dosh) and also takes into account our food intake and manner of eating, the nature of food stuff, Agraha, process of cooking etc. Diagnosis and prognosis mainly on the basis of the constitution type of a person's prakriti and inter-individual variability in humans. Metabolic variability has been correlated with CYP2C19 genetic variability and Human Leukocyte Antigen (HLA) gene polymorphism to elucidate the concept of pharmacogenomics with the prakriti type.



Chronicled appraisal

- Charaka Samhita: Aham as a causative factor in the context of the origin of Purusha (man) and his diseases.
- Sushruta Samhita: Aham restores vigor, provides strength and increase life time Man, memory, ojas and the digestive capability.
- Bhagrat Gita: To achieving success in yoga, appropriate diet along with other activities and regions of life are, in fact, advised.

Dietary guidelines according to Prakriti

Diet	Dietary guidelines according to Prakriti					
	Vata		Pitta		Kapha	
	Use	Avoid	Use	Avoid	Use	Avoid
Grain (Cereals)	Sweet	Sour	Sweet	Sour	Pungent	Sweet
Cereals	Rice	Wheat	Rice	Wheat	Corn	Wheat
Pulses	Green gram	Black gram	Green gram	Red kidney beans	Peas	Soy products
Vegetables	Cucurbit	Leafy veg	Cucurbit	Cucurbit	Brinjal	-
Fruit	Tamarind	Dry fruits	Mango	Orange	Dry fig	Papaya (ripe)
Spices	Cardamom	-	Cloves or	Dry ginger	Mustard	-

Aims & Objective

Improving health and preventing disease through tailored diet and lifestyle prescriptions.

Nutrition-gene interaction



Effect of food on gene expression



Biactive Food Components



Merits and Demerits

- Merits of Nutrigenomics**
- Increased focus on a healthy diet and lifestyle
 - Increased awareness of risk of certain conditions
 - Improved health quality of life
 - Focus on prevention of disease
 - Decreased morbidity and premature mortality
 - Reduced health care costs
 - Better understanding of the mechanisms involved in disease susceptibility
- Demerits of Nutrigenomics**
- Focus only specific nutrigenomic foods
 - Misleading claims
 - Attention is drawn away from other modifiable risk factors
 - Increased costs associated with personalized diet and designer foods

Conclusion

This Ayurveda-inspired concept of personalized nutrition is a novel concept in the nutrigenomic research for developing personalized functional foods and nutraceuticals suitable to one's genetic makeup. The concept of food and drug interact, considering their effects according to the genetic constitution (prakriti) of a person at the systems biology level. Technological platform based on the different omics may help in this regard to develop a better understanding toward Ayurvedic principles on nutrition and Ayurvedogenics. This review introduces and present this novel concept of Ayurnutrigenomics as an emerging area of research, which may unfold future possibilities toward smart yet safe therapeutics.

References

- Mendi DM, Wahl W, Wilkens G. Nutrigenomics and nutrigenetics: the emerging focus of nutrition. *FASEB J*. 2005;19:1603a-1616. <http://dx.doi.org/10.1096/faseb.1903a1616>
- Groth D, Skinner MA, Laing RA. Pharmacogenomics and nutrigenomics: epigenetics and differences. *Eur J Clin Nutr*. 2007;61:507a-517a. <http://dx.doi.org/10.1038/ejcn.190298>
- Mukherjee PK, Nanda SK, Verikash 2, Debnot PK. Changing scenario for promotion and development of Ayurvedashy forward. *J Ethnopharmacol*. 2012;143:424-434. <http://dx.doi.org/10.1016/j.jep.2012.07.036>
- Ordovas JM. Genetic interactions with diet influence the risk of cardiovascular disease. *Am J Clin Nutr*. 2006;83(2 Suppl):445S-446S [Internet]. Available from: <http://ajcn.nutrition.org/content/83/2/445S.full.pdf>
- Kaput J. (2004) Diet-disease gene interactions. *Nutrition* 20, 24-31
- Ordovas, J. M., and Moore, V. (2004) Nutrigenomics and nutrigenomics and nutrigenetics. *Curr Opin Lipidol* 15, 101-108