International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

Development and Characterization of Kalmegh Containingdifferent Types of Lozenges

Mr.L.Gopi*,M.R.Charulatha, V.Punitha, P.Atchaya, M.Sathish, L.Akash
Aadhibhagawancollege of pharmacy, Rantham, T.V.malai, Tamilnadu.

Submitted: 05-04-2023 Accepted: 15-04-2023

ABSTRACT :
Lozenges, or troches, are experiencing a renewed popularity as a means of delivering many different drug products. Lozenges have various advantages and disadvantages. Lozenges are solid preparations that contain one or more medicaments, usually in a flavored, sweetened base, that are intended to dissolve or disintegrate slowly in the mouth. They are used for medications designed to be released slowly to yield a constant level of drug in the oral cavity or to bathe the throat tissues in a solution of the drug. Fresh kalmeghpowder is prepared by ethanolic extraction methods. Various quality control test such as weight variation, hardness, thickness and diameter, disintegration, sensory evaluation, PH are carried out to evaluate the formulation. The masking and unpleasant taste of Active Pharmaceutical ingredient is necessary especially when used for pediatric patient. So masking is done to increase palatability For the preparation of Lozenges, polymers are used.From promising formulation to achieve the purpose which treat viral fever , mouth infection , throat infection , dengue fever ,immunity increase ,which is useful for patients .
KEY POINT : Lozenges , Kalmegh ,

I. INTRODUCTION :

Lozenges are solid preparations that contain one or more medicaments, usually in a flavored, sweetened base, that are intended to dissolve or disintegrate slowly in the mouth. They can be prepared by molding (gelatin and/or fused sucrose and sorbitol base) or by compression of sugar-based tablets. Molded lozenges are sometimes referred to as pastilles, whereas compressed lozenges may be referred to as troches. They are used for patients who cannot swallow solid oral dosage forms well as for medications designed to be released slowly to yield a constant level of drug in the oral cavity or to bathe the throat tissues in a solution of the drug. Lozenges historically have been used for the relief of minor sore throat pain and irritation and have been used extensively to deliver topical anesthetics and antibacterial.

II. MATERIAL AND METHODS :

List of chemical used in Kalmegh , sucrose , dextrose , agar , acacia , talc , citric acid , menthol , peppermint oil , honey , glycerine, PEG1000 , PEG8000 , lactose , zinc , magnesium stearate , sorbitol , methyl paraben .

List of equipment used in weighing balance , hardness tester , thickness tester , friability apparatus , pH analyser , HPLC instrument , U.V spectrophotometer lab India UV 3000+ , FTIR spectrophotometer perkineimer spectrum version 10.4.2 , disintegration apparatus , dissolution apparatus lab India UV 3000+ , melting point apparatus , boiling point apparatus

EXTRACTION OF KALMEGH
SOXHLET EXTRACTION OR HOT CONTINUOUS EXTRACTION:

In this method, finely ground sample was placed in a porous bag or “thimble” made from a strong filter paper or cellulose. Extraction solvent i.e. ethanol 90% was heated in the bottom flask, vaporizes into the sample thimble, condenses in the condenser and drip back. When the liquid content reaches the siphon arm, the liquid contents emptied into the bottom flask again and the process was continued. The final ethanolic extract is collected.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

2.1 METHODS :

2.1.1 Composition of Hard Lozenges

S.NO	INGREDIENTS	F1	F2	F3	F4	F5	F6
1	KALMEGH	0.3	0.3	0.3	0.3	0.3	0.3
2	SUCROSE	3.37	3.35	3.25	3.37	3.35	3.25
3	DEXTROSE	1.32	1.32	1.32	1.32	1.32	1.32
4	AGAR	0.025	0.050	0.075	-	-	-
5	ACACIA	-	-	-	0.025	0.050	0.075
6	CITRIC ACID	0.05	0.05	0.05	0.05	0.05	0.05
7	MENTHOL	0.03	0.03	0.03	0.03	0.03	0.03
8	SORBITOL	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
9	COLOR AGENT	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
10	TOTAL	5gm	5gm	5gm	5gm	5gm	5gm

Table No : 1 Composition Of Hard Lozenges

Procedure for hard lozenges

Medicated lozenges each weighing 5gms were prepared by heating and congealing technique. Syrup base was prepared by dissolving required amounts of sugar in water while heating it and stirring continuously for 90min at the temperature of 110°C. Dextrose was added to the syrup base to prevent crystallization of sugar, and the syrupy base was heated and stirred continuously till a plastic mass was obtained. The temperature was brought down to 90°C and to the plastic mass, drug dispersed in sorbitol solution, polymer, colour and flavour were added and the material was stirred for 30min. Then the mixture was poured in to desire moulds and air dried for 1hr.

2.1.2Composition of Soft Lozenges

S.NO	INGREDIENTS	F7	F8	F9	F10	F11	F12
1	KALMEGH	1.5	1.5	1.5	1.5	1.5	1.5
2	GLYCERIN	70	75	-	-	-	-
3	PEG 1000	-	-	70	75	-	-
4	PEG 8000	-	-	-	-	65	70
5	AGAR	18.5	-	18	-	17.5	-
6	ACACIA	-	19	-	18.5	-	18
7	CITRIC ACID	0.4	0.4	0.4	0.4	0.4	0.4
8	WATER	12	12	12	12	12	12
9	PEPPERMINT OIL	3 to 4 drop	3 to 4 drop	3 to 4 drop	3 to 4 drop	3 to 4 drop	3 to 4 drop
10	COLOR	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S

Table No : 2 Composition Of Soft Lozenges

Procedure for soft lozenges

Medicated lozenges were prepared by heating and congealing technique. Base was prepared by dissolving required amounts of water while heating it and stirring continuously for 90min at the temperature of 90°C. polymers was added to the base to prevent crystallization of base, and the base was heated and stirred continuously till a plastic mass was obtained. The temperature was brought down to 60°C and to the plastic mass, drug dispersed in base, preservative, colour and flavour were added and the material was stirred for 30min. Then the mixture was poured in to desire moulds and air dried for 1hr.

2.1.3 Composition Of compressed tablet Lozenges

Compressed tablet lozenges of Kalmegh were prepared by wet granulation method. Firstly sugar was pulverized to a fine powder and mixed with drug complex. Then acacia and agar mucilage, (color, flavour) were added to make dump mass.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

Then mass was subjected to granulation with sugar and screened through 22 mesh screen. Then granules were dried and passed through 44 mesh screen to form a uniform size of granules. Then granules were lubricated with magnesium stearate talc and zinc. Then granules were compressed in a tablet using tablet machine.

S.NO	INGREDIENTS	F13	F14	F15	F16	F17	F18
1	KALMEGH	70 mg	70 mg	70 mg	70 mg	70 mg	70 mg
2	SUCROSE	810 mg	810 mg	710 mg	810 mg	810 mg	710 mg
3	DEXTROSE	80 mg	90 mg	150 mg	-	-	-
4	LACTOSE	-	-	-	80 mg	90 mg	150 mg
5	AGAR MUCILAGE	10 ml	-	5 ml	10 ml	-	6 ml
6	ACACIA MUCILAGE	-	10 ml	5 ml	-	10 ml	3 ml
7	CITRIC ACID	5 mg	10 mg	30 mg	5 mg	10 mg	40 mg
8	MAGNESIUM STEARATE	10 mg	10 mg	10 mg	10 mg	10 mg	10 mg
9	TALC	8 mg	8 mg	8 mg	8 mg	8 mg	8 mg
10	ZINC	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg
11	PURIFIED WATER	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
12	FAVOURING AGENT	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
13	COLOURING AGENT	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
14	TOTAL	1000	1000	1000	1000	1000	1000

Table No : 3 Formulation Of Compressed Tablet Lozenges

2.1.4Composition Of candy Lozenges

S.NO	INGREDIENTS	F19	F20
1	KALMEGH	0.2	0.2
2	SUCROSE	3	3
3	MILK POWDER	1.5	1.5
4	AGAR	0.1	-
5	ACACIA	-	0.1
6	HONEY	4%	3%

Table No : 4 Formulation Of CandyLozenges

Procedure for soft lozenges

Lozenges were prepared by heating and congealing technique. Sugar base was prepared by dissolving required amounts of water while heating it and stirring continuously for 5 min at the temperature of 110°C. milk powder was added to the base to prevent crystallization of sugar base, and the sugar base was heated and stirred continuously till a plastic mass was obtained. The temperature was brought down to 60°C and to the plastic mass, drug dispersed in base, preservative, colour were added and the material was stirred for 10min. Then the mixture was poured in to desire moulds and air dried for 30min.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

F3 Hard lozenges F12 Soft lozenges F18 compressed tablet F20 Candy lozenges
Fig : 1 formulation of different types of lozenges

III. 3.PREFORMULATION STUDY

3.1 Post Compressional Studies

Apparent bulk density was determined by placing pre- sieved granules into a graduated cylinder and measuring the volume and weight as it is. It was calculated by using formula

Bulk density = Mass / volume

3.2 Tapped density:

Weighed sample of granules was transferred to a graduated cylinder and was tapped. Tapped density was calculated by formula given in equation

Tapped Density = Weight of granules / Tapped volume

3.3 Hausner's Ratio:

The Hausner's ratio is a number that is correlated to the flow ability of a powder or granular material. It is calculated by formula given in equation

Hausner's Ratio = Tapped Density / Bulk Density

3.4 Angle of Repose:

The angle of repose of blend was determined by the fixed funnel method. The accurately weighed granules were taken in the funnel. The height of the funnel was adjusted in such a way that the tip of the funnel just touched the apex of the blend. The blend was allowed to flow through the funnel freely in to the surface. The diameter of the powder cone was measured and angle of repose was calculated using the formula given in equation

Tan θ= h/r

3.5 Compressibility Index (Carr's index)

This parameter is the measure of propensity of powder to be compressed and reflect the relative importance of inter particulate interaction shows in table.

$$\text{Carr's Index} = \frac{100\,(TD - BD)}{TD}$$

IV. 4. EVALUATION OF DIFFERENT TYPES OF LOZENGES

4.1 Physical Parameter

The general appearance of a lozenges including size, shape, colour, odour, taste having should be observed. It is must to have a good appearance for consumer acceptance. Physical changes may occur during storage, which can be determined PH using PH meter apparatus.

4.2 Thickness

The thickness and diameter of the formulated lozenges were measured by using Vernier callipers.

4.3 Weight Variation

The formulated lozenges were tested for weight uniformity. 10 tablets were collectively and individually. From the collective weight, average weight was calculated. Each lozenges weight was then compared with average weight to as certain whether it is with in permissible limits or not.

4.4 Hardness

The lozenges crushing strength, which is the force required to break the lozenges by compression in the diametric direction was measured in triplicate using Pfizer tablet hardness tester.

4.5 Friability

The Roche friability test apparatus was used to determine the friability of the lozenges. 5 pre weighed lozenges were placed in the apparatus, which was subjected to 100 revolutions. Then the lozenges were reweighed.

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

4.6 Diameter

It is also dimensionally described & controlled. Tablet diameter can be measured by using dial calliper. It also should measure for six tablets in general.

4.7 Moisture Content

The sample was weighed and crushed in a mortar. From this, one gram of the sample was weighed and placed in desiccators for 24 hours. After 24 hours the sample is weighed. The moisture content is determined by the abstracting the final weight from initial weight of lozenges.

4.8 FT-IR Analysis

Infrared spectrum of pure drug was recorded by using PerkinElmer-FTIR spectrum version 10.4.2. The IR spectra ofkalmegh, kalmegh + polymer, are shown in the following figure.

4.9 Disintegration Test

Disintegration study performed by disintegration apparatus .Put one lozenges into each tube suspend the assembly in the beaker containing pH 7.1 phosphate buffer and operate without the discs 30 min. Remove the assembly from the liquid.

4.10In-Vitro Drug Release

In vitro release studies were performed using USP Apparatus II (Paddle type). The dissolution test was performed using 900 ml of phosphate buffer 7.1 37 ± 0.5°C, 100 rpm. Samples (5 ml) were collected at predetermined time intervals and replaced with equal volume of fresh medium, and analysed using UV-Visible spectrophotometer at λ= 224 nm.

Apparatus :USP Type II (Paddle type)
Medium :phosphate buffer 7.1
Rpm :100
Volume :900 ml
Temp :37 ± 0.5ºC

4.11 HPLC analysis

Phosphate buffer + methanol 30:70 using this ratio analysis to determine the active compounds.

V. RESULT AND DISCUSSION :

5.1 Preformulation study for F13 to F18 :

BATCH NO	BULK DENSITY (gm/ml) (± SD)	TAPPED DENSITY (gm/ml) (± SD)	CARR'S INDEX (%) (± SD)	HAUSNER'S RATIO (± SD)	ANGLE OF REPOSE (± SD)
F13	**0.488± 0.108**	**0.558±0.051**	**17.71**	**1.14**	**24.12±0.021**
F14	**0.531± 0.113**	**0.599±0.107**	**18.86**	**1.12**	**25.36±0.042**
F15	**0.523± 0.064**	**0.696±0.116**	**17.51**	**1.33**	**28.44±0.043**
F16	**0.577± 0.108**	**0.704±0.063**	**22.20**	**1.22**	**25.61±0.093**
F17	**0.528± 0.065**	**0.625±0.043**	**18.44**	**1.18**	**23.12±0.033**
F18	**0.568± 0.081**	**0.724±0.089**	**17.84**	**1.27**	**29.19±0.069**

Table No : 5 Preformulation study

5.2 Physical Parameter

BATCH NO	COLOUR	ODOUR	TASTE	SHAPE
F1	Brown	Pleasant	Aromatic	Round
F2	Brown	Pleasant	Aromatic	Round
F3	Brown	Pleasant	Aromatic	Round
F4	Light Brown	Pleasant	Aromatic	Round

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

F5	Light Brown	Pleasant	Aromatic	Round
F6	Light Brown	Pleasant	Aromatic	Round
F7	Orange	Aromatic	Aromatic	Round
F8	Orange	Aromatic	Aromatic	Round
F9	Orange	Aromatic	Aromatic	Round
F10	Orange	Aromatic	Aromatic	Round
F11	Orange	Aromatic	Aromatic	Round
F12	Orange	Aromatic	Aromatic	Round
F13	Light Orange	Aromatic	Sweet	Round
F14	Light Orange	Aromatic	Sweet	Round
F15	Orange	Aromatic	Sweet	Round
F16	Pink	Aromatic	Sweet	Round
F17	Pink	Aromatic	Sweet	Round
F18	Pink	Aromatic	Sweet	Round
F19	Yellow	Aromatic	Sweet	Round
F20	Yellow	Aromatic	Sweet	Round

Table No :6 Physical Parameter

BATCH NO	PH	WEIGHT VARIATION (gm)	THICKNESS (mm)	HARDNESS (Kg/Cm^2)
F1	6.8	4.98±0.04	7.7±0.1	11.4±0.1
F2	6.7	5.05±0.02	7.4±0.2	11.6±0.2
F3	6.8	4.95±0.06	7.8±0.1	11.2±0.1
F4	6.9	4.93±0.06	7.6±0.1	10.4±0.2
F5	6.9	4.96±0.08	7.7±0.1	10.9±0.3
F6	7.1	5.02±0.08	7.5±0.3	11.3±0.3
F7	7.1	3.51±0.08	6.5±0.3	9.8±0.8
F8	7.4	3.59±0.04	6.4±0.2	9.9±0.2
F9	7.1	4.01±0.03	6.7±0.2	10.3±0.6
F10	7.3	4.06±0.11	6.6±0.1	9.9±0.2
F11	7.3	4.14±0.06	6.8±0.3	10.3±0.4
F12	7.1	4.12±0.07	6.5±0.3	10.8±0.3
F13	7.1	4.98±0.04	6.7±0.1	19 ± 1
F14	7.3	5.05±0.02	6.4±0.2	14 ± 1
F15	7.1	4.95±0.06	6.7±0.1	20 ± 1
F16	7.2	4.93±0.06	6.6±0.1	19 ± 1
F17	7.2	4.96±0.08	6.7±0.1	18 ± 1
F18	7.4	5.02±0.08	6.7±0.3	21 ± 1
F19	8.2	4.9±0.4	6.3±0.2	12.8±0.1
F20	8.3	5.1±0.2	6.4±0.3	11.8±0.3

Table No :7 Evaluation Parameter

BATCH NO	FRIABILITY %	MOISTURE CONTANT %	DISINTEGRATION TEST (min)	DRUG CONTENT %
F1	0.86±0.12	0.6	14	95.93±0.3
F2	0.93±0.15	0.6	17	98.17±0.5
F3	1.66±0.12	0.7	21	99.96±0.2
F4	0.92±0.13	0.5	18	87.29±0.2
F5	0.88±0.13	0.6	23	91.98±0.2
F6	1.85±0.06	0.8	24	98.49±0.2
F7	0.67±0.06	0.8	15	95.73±0.5
F8	0.84±0.08	0.7	16	98.52±0.1

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

F9	0.43±0.07	1.1	19	93.77±0.2
F10	0.72±0.15	0.7	19	93.58±0.2
F11	0.86±0.1	1.2	22	99.31±0.2
F12	0.48±0.8	0.9	25	99.12±0.2
F13	0.18±0.12	0.8	22	95.97±0.3
F14	0.14±0.15	0.8	22	91.17±0.5
F15	0.19±0.12	0.7	22	99.90±0.2
F16	0.20±0.13	1.1	22	88.29±0.2
F17	0.11±0.13	0.8	23	89.93±0.2
F18	0.08±0.06	0.9	24	98.48±0.2
F19	0.31±0.03	0.8	21	95.73±0.5
F20	0.61±0.07	0.8	20	78.52±0.1

Table No :8 Evaluation Parameter

5.3 IR Spectrum

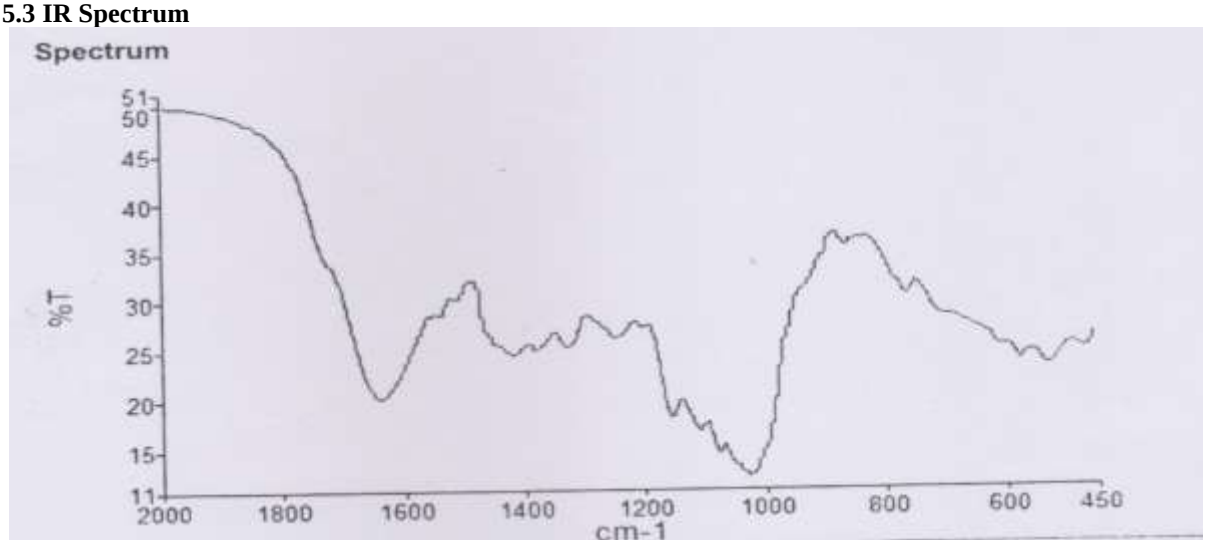


Fig : 2 IR Spectrum of kalmegh

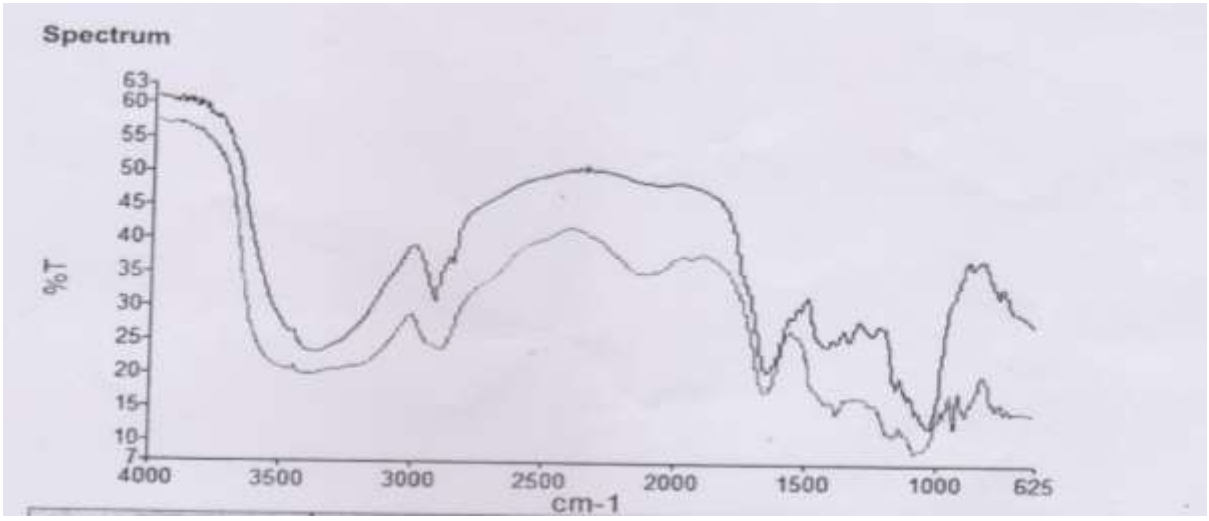


Fig : 3 IR Spectrum of kalmegh + agar (F3)

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

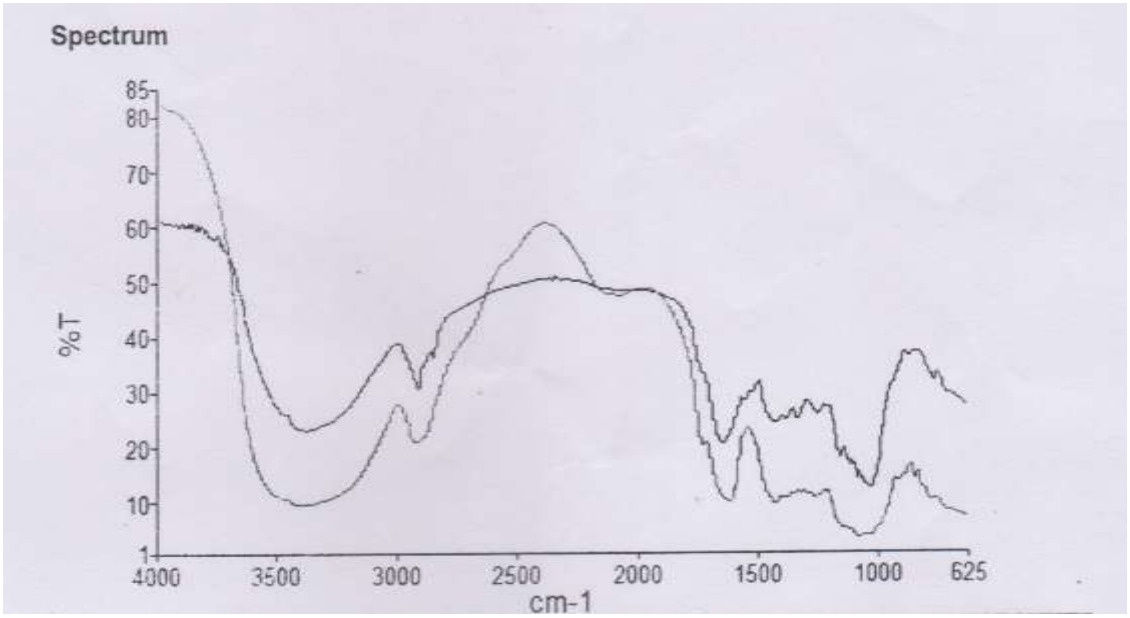


Fig : 4 IR Spectrum of kalmegh + acacia (F12)

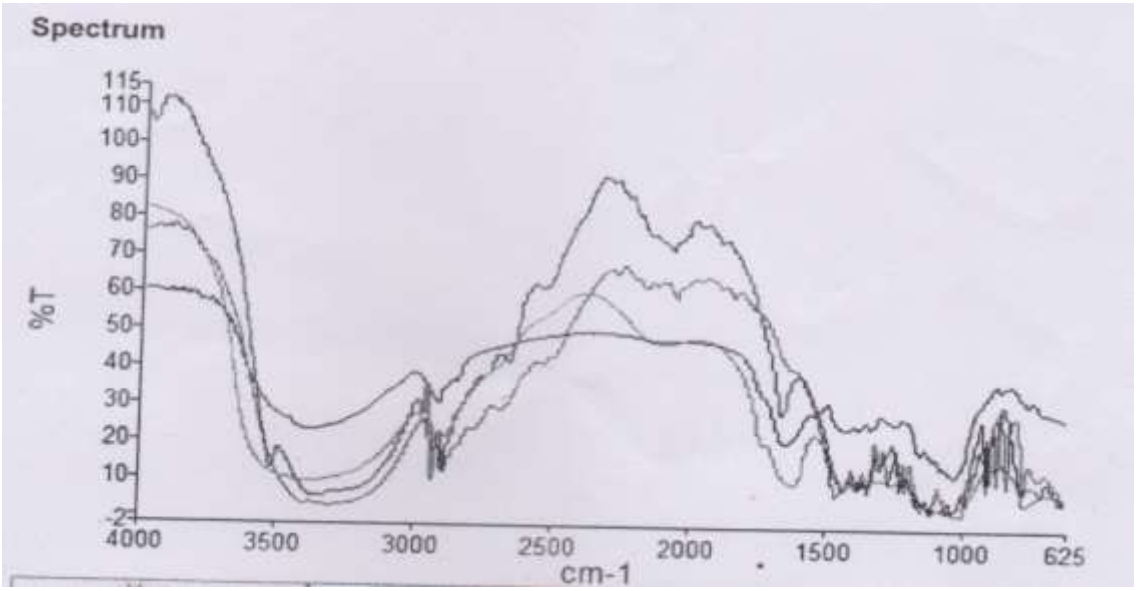


Fig : 4 IR Spectrum of kalmegh + acacia + agar + lactose (F18)

5.4 HPLC Spectroscopy

Figure No : 5 Blank ; Vial 1 ; Injection Volume 20.0 ; Injection 1

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

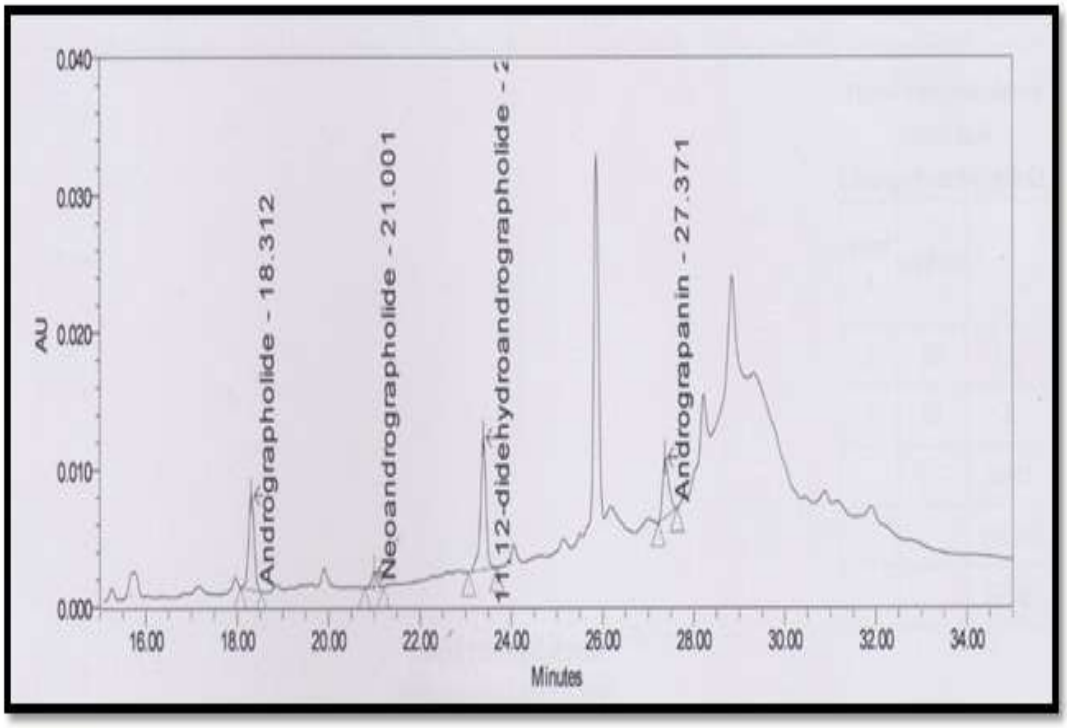


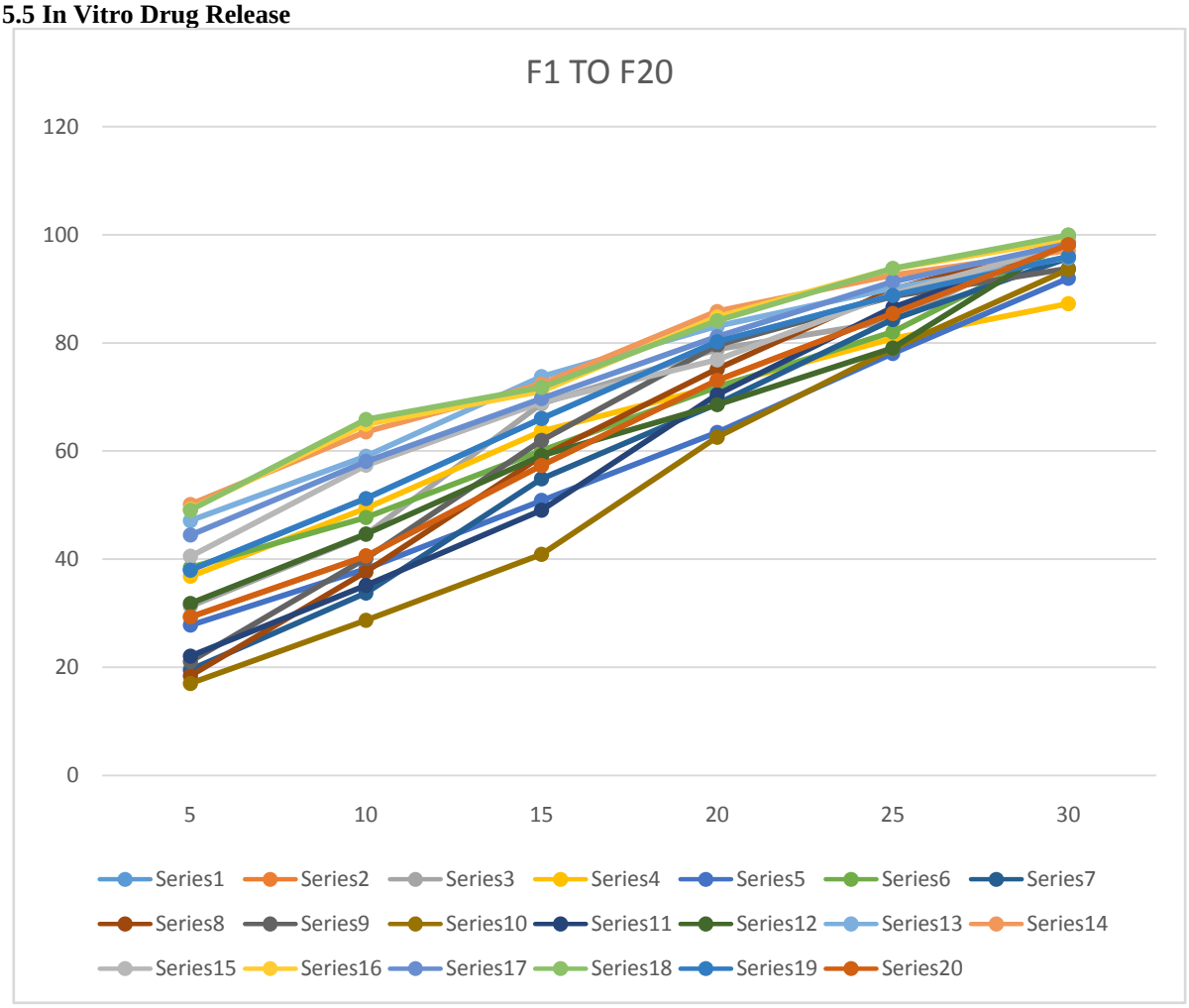
Figure No : 6 Sample ; Vial 7 ; Injection Volume 20.0 ; Injection 1

S.NO	PARAMETER	11,12 – DIDEHYDRO ANDROGRAPHOLIDE	ANDROGRAPANIN	NEOANDROGRAPHOLIDE	ANDROGRAPHOLIDE
1	RT	23.395	27.371	21.001	18.312
2	Area	80596	40532	9015	59034
3	%Area	21.21	21.43	4.77	31.21
4	USP Tailing	0.8	1.3	1.0	1.0
5	USP Plate Count	212854	198458	148894	198458
6	USP Resolution	11.2	16.6	12.0	-
7	RRT~	1.278	1.495	1.147	-
8	RT Reference Used	Andrographolide	Andrographolide	Andrographolide	Andrographolide
9	Int Type	BB	BB	BB	BB
10	Result #	1	1	1	1

Table No : 9 HPLC analysis of Kalmegh

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

5.5 In Vitro Drug Release



Figures : 7Dissolution Drug Release F1 to F20

VI. CONCLUSION

The results showed that there was no interaction between API and all the excipients selected. The kalmegh lozenges were successfully formulated by heating and congealing technique wet granulation technique method using the selected excipient quantities. The formulated lozenges were evaluated for both pre-compression and post-compression parameters as per requirements of standards. The formulated kalmegh lozenges with polymer of agar and acacia. From among the entire batches, formulation F3 showed 99.16% drug release at 30 minutes, F12 showed 99.31% drug release at 30 minutes , F18 showed 99.86% drug release at 30 minutes , F20 showed 99.52% drug release at 30 minutes kalmegh would be a promising formulation to achieve the purpose which treat viral fever , mouth infection , throat infection , dengue fever ,immunity increase ,which is useful for patients .

FUTURE STUDY

The finding of the present study has initiated the pharma company to go in for scale up trial formulation. Based on the formulation reproducible results produced from batch to batch the pharma company will decide to launch the product in the future.

OTHER STUDY IN FUTURE :

✓ Formulation and evaluation of kalmegh lollipop
✓ Formulation and evaluation of kalmegh chocolate
✓ Formulation and evaluation of kalmegh syrup

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 2 Mar-Apr 2023, pp: 1379-1389 www.ijprajournal.com ISSN: 2249-7781

REFERENCES

[1]. SV Sastry, JR Nyshdham. and JA Fix, Pharmaceutical Science and Technology Today. 2000, 3,138-45.
[2]. J F Firriolo, Oral Surg. Med. Oral Pathol,1994, 78: 2,189-93.
[3]. H Mohan.,Text book of Pathology – The oral cavity and salivary glands. 4th ed., Jaypee Brothers, Medical Publishers (P) Ltd., New Delhi; 2000, 494-96.
[4]. A Herbert, LL Lieberman, "Medicated Lozenges" Pharmaceutical dosage forms – tablet series, 2nd Edn ,Marcel Dekker Inc. New York and Basel, 1991, I: 339-467
[5]. S Dineshmohan, K Vanitha, A Ramesh, G Srikanth and S Akila, International Journal of Research in Pharmaceutical and Biomedical Sciences, 2010, Vol. 1 (2), 105-108.
[6]. Paul M, ESCMID Guideline for the Management of Acute Sore Throat, 2012, 18, ESCMID, 1-18.
[7]. 7.Maheshwari R, Jain V, Ansari R, Mahajan SC, Joshi G, A review on lozenges, BBB, 2013, 1-9.
[8]. Shinde SG, Kadam V, Kapse GR, Jadhav SB, Zameeruddin , Bharkad VB, A review on lozenges, IAJPR, 2014, 4, 567-570.
[9]. Pothu R &Yamsani MR, Lozenges formulation and evaluation: A review, IJAPR, 2014, 1, 290-294.
[10]. Esimone CO et al., In vitro Antimicrobial Evaluation of Lozenges Containing Extract of Garlic and Ginger, Int J Health Res. 2010; 3(2): 105-110.