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FORMULATION AND EVALUATION OF MOUTH DISSOLVING FILM OF VENLAFAXINE HYDROCHLORIDE

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ABSTRACT

Objective: Venlafaxine hydrochloride is serotonin norepinephrine-reuptake inhibitors, antidepressants. Main symptoms associated with this disease are anger, loss of energy, sleep changes and weight changes etc. which results in major depressive disorder, generalized anxiety disorder etc requires fast relief. So, dosage form which gives quick onset of action is needed. MDF was suitable dosage form. The objective was to formulate MDF having least disintegration time with a better mechanical strength which ultimately gives faster onset of action. Experimental work: The films were formulated by various film forming polymers (PVA, HPMC E15, PVP K30, Guar Gum and Xanthan Gum), Plasticizers (PEG 400, PG and Glycerin), saliva stimulating agent (citric acid), sweetening agent (mannitol) and surfactant (tween 80). MDF were prepared by solvent casting technique. Trial batches were formulated to optimize plasticizer, polymer and polymer combination. The optimized plasticizer and polymer combination was selected, 32 factorial designs was applied and from factorial batches the batch with least DT and good mechanical properties was optimized and kept for stability study for 1 month. **Result:** Trail batches, PG was optimized as plasticizer. While single polymer was not able to produce the film with desired quality, polymer combination was used. The polymer combination of HPMC E15 and PVA was optimized. Further factorial design was applied, the batch with 14mg of HPMC E15 and 4mg of PVA was optimized and found stable after 1 month. The optimized batch of venlafaxine hydrochloride film having desired DT and mechanical properties that is potentially useful for the treatment of depression were fast onset of action is required.

KEYWORDS: Venlafaxine hydrochloride, Mouth dissolving film, PG, HPMC E15, PVA.

1. INTRODUCTION

The oral route is the most suitable and preferred route among all the other delivery for the administration of drug because of its ease administration, cost effective, no pain, easily acceptable, convenient and patient compliance. In recent times, fast dissolving dosage forms have been started gaining more recognition and acceptance. Oral dissolving films are helpful to the patient having difficulty in swallowing, pediatric and geriatric patients who have fear of choking traditional oral solid dosage form and as an alternate to tablet, capsules. The films are like similar to postage stamp in their size, shape and thickness. This type of dosage forms is mostly suitable for pain, CNS disorder, cough, nausea, allergic conditions etc. Films, when placed on tongue, immediately hydrates by soaking saliva following disintegration and/ or dissolution releasing active pharmaceutical ingredient from the dosage form. This type of system consists of solid dosage forms that dissolve and/ or disintegrate rapidly in the oral cavity without the administration of water. The film is an ideal intra oral fast dissolving dosage form, which is easy to handle and administer, maintains a simple and convenient packaging, improve unpleasant taste. The film is placed on the top or the floor of the tongue, which holds on to the site of application and quickly releases the active agent for local and/or systemic absorption.

Venlafaxine hydrochloride (1-[2-(dimethylamino-1-(4-methoxyphenyl) ethyl] cyclohexan-1-ol; hydrochloride) is a serotonin norepinephrine-reuptake inhibitors (SNRIs) an antidepressants agent, used to treat depression. It acts by inhibiting the reuptake of serotonin and noradrenaline. It is a Class I drug (High Permeability, High solubility). Main symptoms associated with this disease are anger or irritability, loss of energy, feelings of helplessness, sleep changes, appetite or weight changes etc. which results in major depressive disorder (MDD), generalized anxiety disorder (GAD), social anxiety disorder (social phobia), neuropathic pain. So, the above all mentioned symptoms require fast relief so for this MDF is most suitable which give fast action and it fits in the parameters for ideal characteristics for drug for MDF. (1) Low dose 25mg. (2) Low molecular weight 313.862 gm/mol. (3) Freely soluble in saliva and water. (4) Partially ionized at pH of oral cavity.

Mouth dissolving film: Ease of administration and may enhanced patient compliance especially in case of pediatric, geriatric. Convenient for dysphasic patient having difficulty in swallowing tablets and capsules. Convenient to administer during travelling without need of

water. Fast disintegration, rapid release, fast absorption, quick onset of action. Large surface area available for dissolution of MDF than ODT. May enhanced oral bioavailability of molecule. Avoid first pass metabolism and smaller dose. Dosage form can be consumed at any place and any time as per convenience of the individual.

2. MATERIALS AND METHOD

2.1 Materials

Venlafaxine Hydrochloride (Drug) powder was obtained from Zydus pharmaceuticals. And other Excipients like HPMC, PVP K30, PVA, Xanthan gum, Guargum, PG, Glycerin, PEG 400, Mannitol, Citric acid and Tween 80 were obtained from ACS chemicals.

2.2 Preparation of mouth dissolving film by Solvent casting technique

Mouth dissolving films were prepared by using solvent casting technique. The required amount of film forming polymer was allowed to hydrate in a minimum amount of distilled water for one-two hours. Then it uniformly dispersed to get clear viscous solution of film forming polymer. Then after the required quantity of plasticizer was added to polymer solution (Solution A). All other ingredients including drug were dissolved in another beaker in minimum amount of water (Solution B). Solution B is added into solution A with constant stirring to form clear viscous aqueous solution containing homogeneously dispersed drug (Solution C). The above produced solution was set aside in uninterrupted condition until entrapped air bubbles were removed. The aqueous solution was casted in petridish made up of glass ($62.17cm^2$).

Dose calculation of Venlafaxine Hydrochloride

Oral dose of Venlafaxine hydrochloride is 25mg

Each film contains 25 mg of Venlafaxine hydrochloride

Area of each film = 2*2 =4 cm^2

Area of petridish =pr^2 (where r = Radius of petridish)

=3.14*$(4.45)^2$

=$62.17cm^2$

4 cm^2 area of film contains 25mg Venlafaxine hydrochloride

$62.17cm^2$ area of film contains =62.17*25/4=388.562

~ 389mg Venlafaxine hydrochloride was taken for whole petri plate area.

3. RESULT AND DISCUSSION

3.1 Identification of drug

(1) By melting point: The melting point of drug was found out by capillary method and measured value was compared with the literature survey. 214ºC Reported (STD 215-217ºC).

(2) By λ max: Solution of Venlafaxine hydrochloride (10µg/ml) was prepared in the stimulated saliva (pH 6.8) and the solution was scanned for absorbance between 200-400 nm using UV spectrophotometer. 221 nm in Stimulated Saliva pH 6.8 (STD at 224nm).

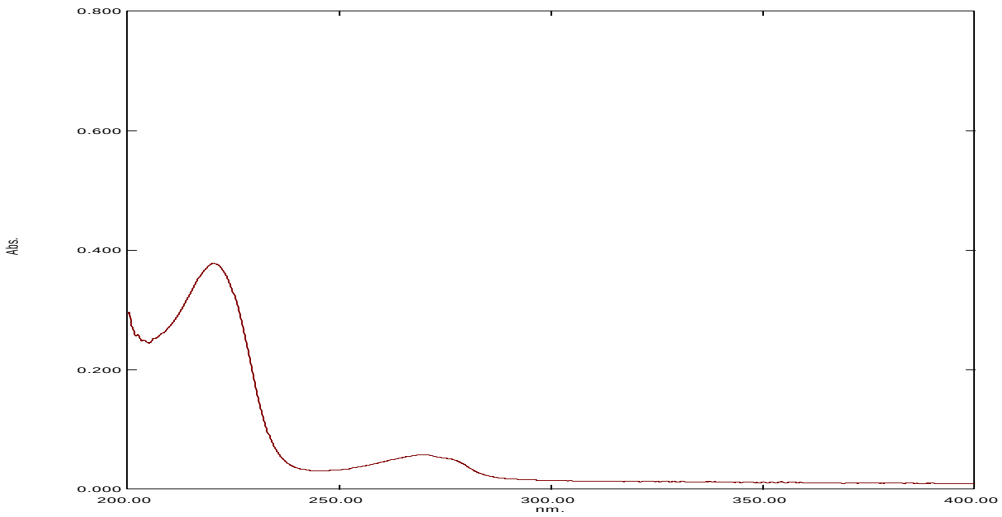

Figure 1: U.V absorption of Venlafaxine Hydrochloride.

(3) By FTIR: The IR studies were carried out by Fourier Transform Infrared (FTIR) instrument.

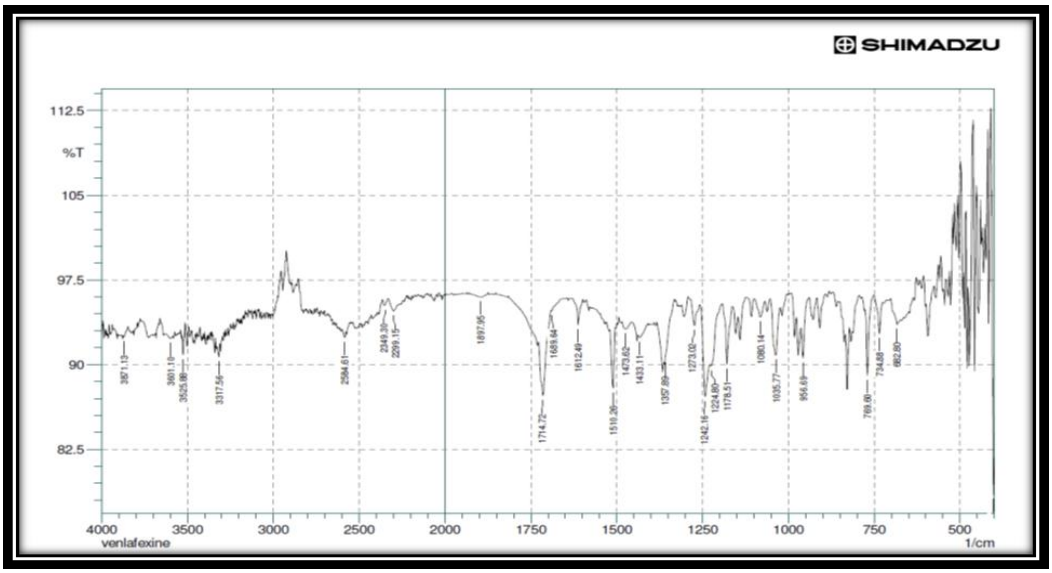

Figure 2: FTIR of Venlafaxine Hydrochloride.

3.2 Drug polymer interaction study by FTIR

Venlafaxine hydrochloride was mixed with combination of polymers in ratio of 1:1 and kept in FT-IR (Shimadzu Miracle 10).

Venlafaxine hydrochloride along with other excipients.

Table 1: Interpretation data of FTIR of drug and polymers.

Sr.No	Functional group	Standard value	Observed value(Drug)	Observed value (Drug+Excipient)
1	OH	3650-3584	3601.10	3684.04
2	CH stretching	1480-1380	1433.11	1423.47
3	C_6H_5	1500-1600	1510.26	1512.19

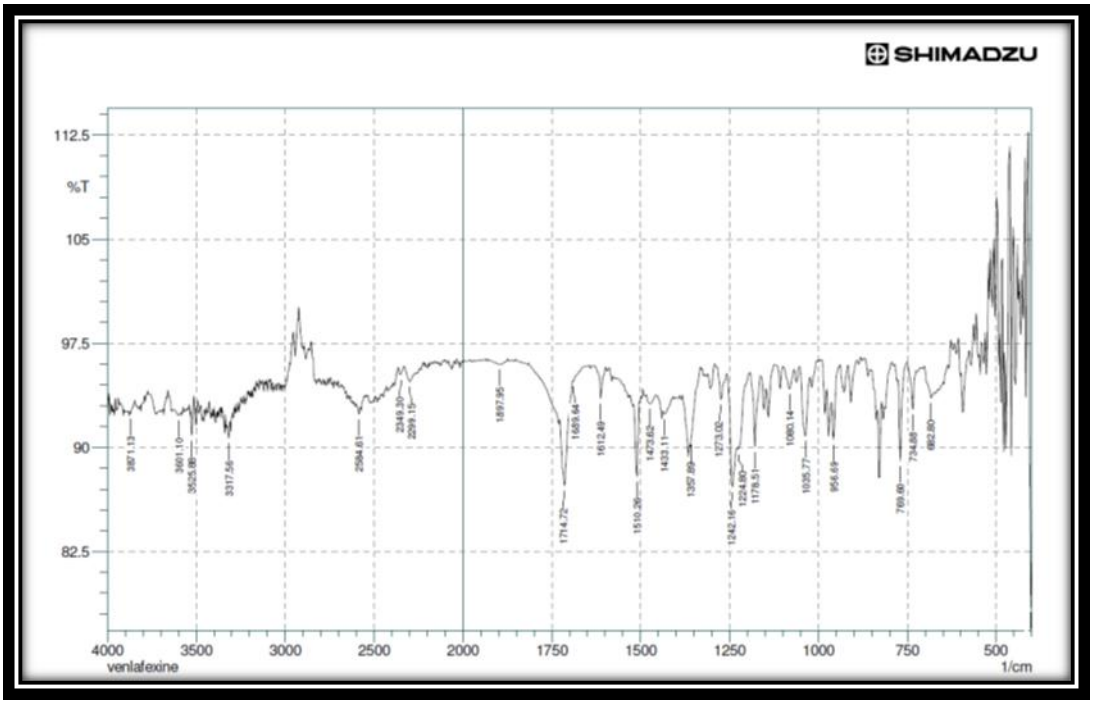

Figure 3: FTIR of Drug and Excipients.

Observation from FTIR

OH stretching vibration – 3684.04 cm-1

C-H stretching – 1423.47 cm-1

C6H5 stretching vibrations- 1512.19 cm-1

The peaks which are observed in FT-IR spectra of drug are not hindered in FTIR spectra of Drug + Excipients mixture. Here no interaction takes place. So, Drug and excipients are compatible.

3.3 Calibration curve in 6.8 phosphate buffer

Table 2: U.V. Spectrophotometer readings of Venlafaxine Hydrochloride at 221 nm. (STD at 224nm).

Concentration (µg/ml)	Absorbance at 221 nm			Mean Absorbance ± SD (n=3)	
	I	II	III		
0	0	0	0		0
5	0.206	0.209	0.215	0.210 ± 0.004	
10	0.332	0.319	0.337	0.329 ± 0.009	
15	0.397	0.389	0.412	0.399 ± 0.011	
20	0.554	0.547	0.560	0.553 ± 0.006	
25	0.618	0.611	0.645	0.624 ± 0.017	
30	0.729	0.719	0.724	0.724 ± 0.005	

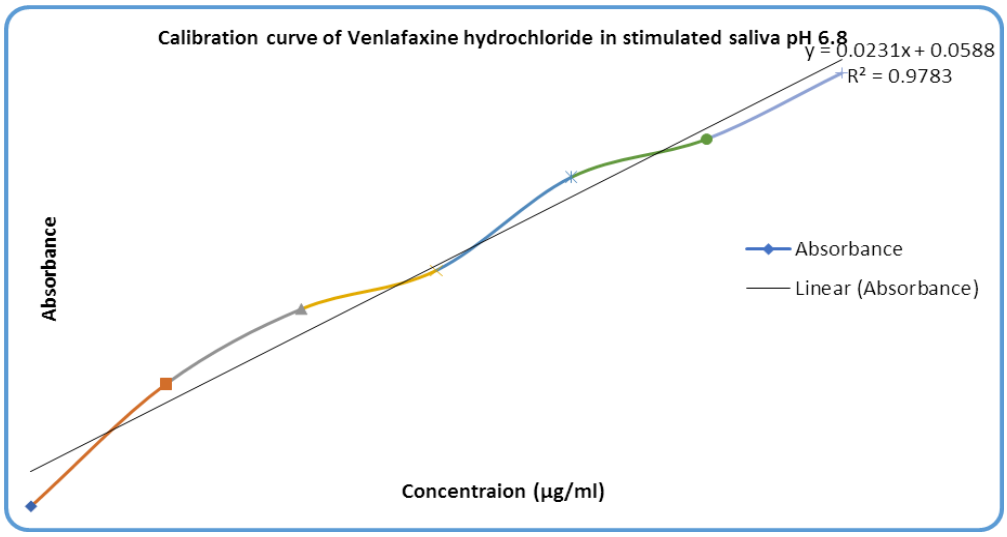

Figure 4: Calibration curve of Venlafaxine Hydrochloride.

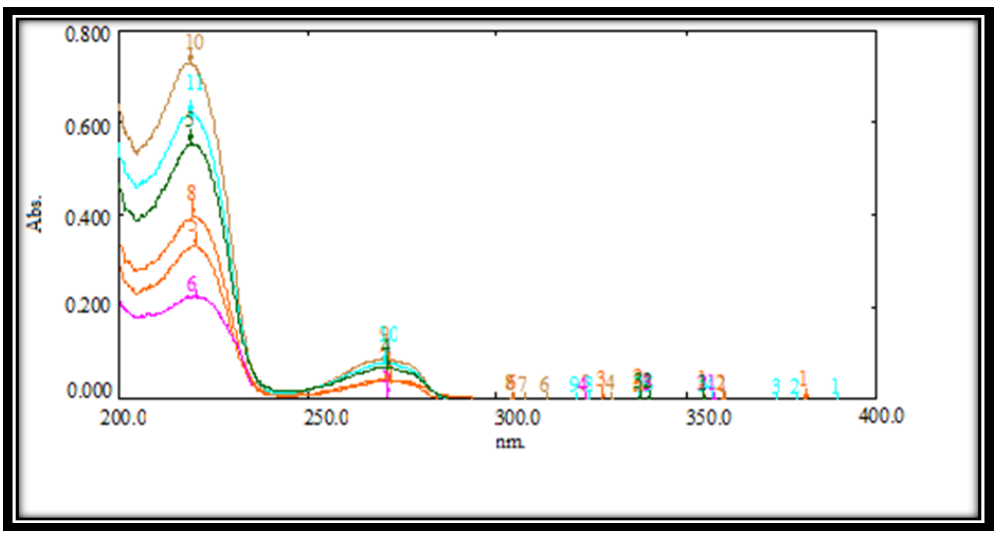

Figure 5: Overlay Spectrum for various concentration of Venlafaxine Hydrochloride.

3.4 Optimization of Plasticizer

Table 3: Formulations for optimization of plasticizer B1 to B5.

INGREDIENTS(mg)	B1	B2	B3	B4	B5
HPMC E15	14	14	14	14	14
	(35)*	(35)*	(35)*	(35)*	(35)*
Polyvinyl pyrrolidone	6	6	6	6	6
K30 (PVP K30)	(15)*	(15)*	(15)*	(15)*	(15)*
Glycerin	3	-	-	-	-
	(15)				
PolyethyleneGlycol	-	3	-	-	-
(PEG400)		(15)			
Propylene glycol(PG)	-	-	3	4	2
			(15)	(20)	(10)
Mannitol	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Citric acid	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Tween 80	q.s.	q.s.	q.s.	q.s	q.s
Distilled water	q.s	q.s	q.s.	q.s.	q.s

Above table include the material weighed for 4 cm^2 film area.

* %W/W of total film weight

Table 4: Evaluation parameter for B1 to B5 batches.

EVALUATION PARAMETER	B1	B2	B3	B4	B5
1.Appearance	Good	Poor	Good	Good	Moderate
2.Mechanical Properties:					
Folding endurance	128	89	177	211	132
Tensile strength(gm/cm^2)	10.04	9.03	11.97	13.54	10.19
% Elongation	10	10	11	10	10
3. Thickness(mm)	0.1	0.08	0.08	0.09	0.12
4. Surface pH	6.47	6.56	6.50	6.57	6.55
5. Disintegration time (sec)	73	43	49	44	38

DISCUSSION

B1 batch contains glycerin as plasticizer. Films prepared thus having good appearance somewhat hard and films formed were transparent. It was having moderate plasticity. B2 batch contains PEG 400as plasticizer. Films thus prepared were found to be sticky and white spots were appearing in the film formed and showed less folding endurance. B3 batch contains PG as plasticizer, it has elegant transparent appearance as well as it can being easily separable from Petridish. Films were having good folding endurance as well as desired plasticity. Also film shows non sticky nature. According to above results, batch B3 produced the films of desired quality thus PG is optimized Plasticizer. Then from batch B3, B4, B5 it

can be concluded that B4 20% W/W of polymer weight was given maximum folding endurance amongst all three batches. And elasticity was found to be good. And were transparent.

3.5 Optimization of Polymer

For the consistency of each batch, two formulations were formulated for each batch and evaluation was done for that.

Table 5: Formulations for optimization of polymer B6 to B10.

INGREDIENTS(mg)	B6	B7	B8	B9	B10
Venlafaxine	25	25	25	25	25
Hydrochloride					
Polyvinyl pyrrolidone K30	20	-	-	-	-
(PVP K30)	(50)*				
Polyvinyl Alcohol (PVA)	-	20	-	-	-
		(50)*			
HPMC E15	-	-	20	-	-
			(50)*		
Xanthan gum	-	-	-	20	-
				(50)*	
Guar gum	-	-	-	-	20
					(50)*
Propylene glycol (PG)	4	4	4	4	4
	(20)	(20)	(20)	(20)	(20)
Mannitol	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Citric acid	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Tween 80	q.s.	q.s.	q.s.	q.s.	q.s.
Distilled water	q.s	q.s.	q.s.	q.s.	q.s.

Above table include the material weighed for 4 cm^2 film area

*%W/W of total film weight

Table 6: Evaluation parameter for B6 to B10 batches.

EVALUATION PARAMETERS	B6		B7		B8		B9		B10	
	I	II	I	II	I	II	I	II	I	II
1.Appearance	Sticky		Moderate		Good		Sticky		Moderate	
2.Mechanical Properties:										
Folding endurance	-	-	277	264	247	252	110	127	50	27
Tensile strength(gm/cm^2)	-	-	18.21	17.46	14.21	15.7	3.25	4.18	2.09	2.55
% Elongation	-	-	17.69	18.12	15.52	16.8	4.53	4.50	2.26	2.44
3.Thickness(mm)	-	-	0.10	0.15	0.08	0.09	0.06	0.45	0.08	0.07
4.Surface pH	-	-	6.31	6.10	6.57	6.48	6.39	6.44	6.68	6.57
5.Assay	-	-	78.48	81.58	83.33	80.5	73.61	78.32	69.74	72.81
6.Disintegration time (sec)	-	-	47	49	37	40	56	50	86	79

Table 7: In vitro drug release for B7 to B10.

TIME(min)	% CDR				
	B6	B7	B8	B9	B10
0	-	0	0	0	0
1	-	35.25	40.45	15.97	35.76
2	-	50.11	51.45	36.23	90.37
3	-	62.55	68.24	48.34	96.29
4	-	73.45	76.54	58.16	98.89
5	-	81.10	84.08	73.51	98.53

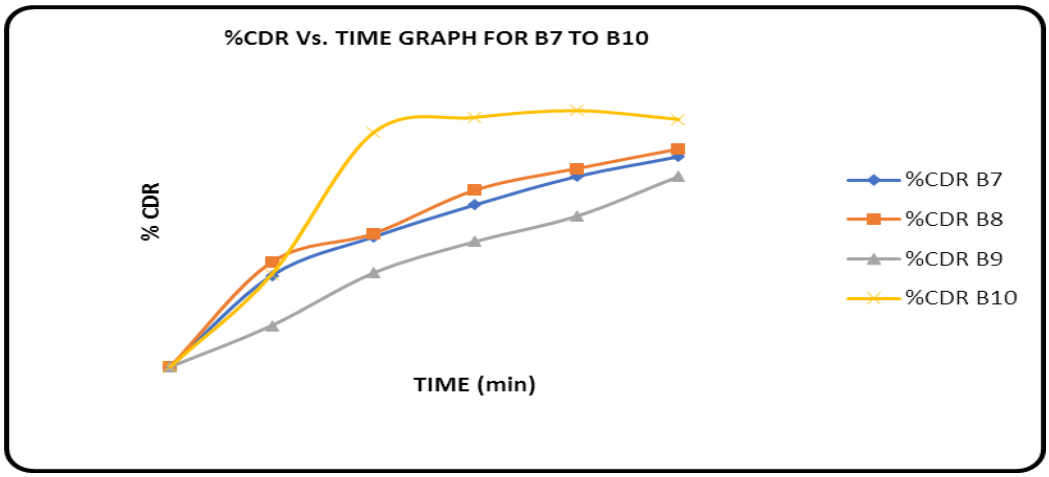

Figure 6: %CDR for batches B7 to B10.

DISCUSSION

B6 batch contains PVPK30 which is a highly hygroscopic and sticky material films produced by using PVPK30 showed poor separability from petridish and so, peeling of film was not possible and it had an unacceptable physical characteristics. B7 batch contains PVA, that produced soft film and drug release from this was found to be good. Also it had good folding endurance value and % Elongation is high. B8 batch contains HPMC that produced thin and plastic like film. It showed very fast disintegration i.e. less disintegration time and gives good drug release profile. B9 batch contains Xanthan Gum it is dispersed uniformly in a petridish and produces the film and somewhat sticky nature. On contact with dissolution medium it swells and forms viscous solution which doesn't allow desirable drug release. B10 batch contains Guar gum that wasn't dispersed uniformly in the solvent and the solution became hazy and films produced were not transparent. Here uniform drug release didn't obtain due to ununiform film layer. According to above results obtained of these batches, we can say that no individual polymer was able to produce film of desired property and quality, to overcome this problem the combination of polymers were taken for further batches. Combination of

HPMC E15 with other polymers was chosen because HPMC E15 has low viscosity and it helps in faster disintegration of film.

3.6 Optimization of Polymer combination

For the consistency of each batch, two formulations were formulated for each batch and evaluation was done for that.

Table 8: Formulations for optimization of polymer combination B11 to B14.

INGREDIENTS(mg)	B11	B12	B13	B14
Venlafaxine hydrochloride	25	25	25	25
HPMC E15	16	16	16	16
	(40)*	(40)*	(40)*	(40)*
PVA	4	-	-	-
	(10)*			
PVPK30	-	4	-	-
		(10)*		
Xanthan Gum	-	-	4	-
			(10)*	
Guar Gum	-	-	-	4
				(10)*
Propylene glycol(PG)	4	4	4	4
	(20)	(20)	(20)	(20)
Mannitol	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Citric acid	2.4 (6)*	2.4 (6)*	2.4 (6)*	2.4 (6)*
Tween 80	q.s.	q.s.	q.s.	q.s.
Distilled water	q.s.	q.s.	q.s.	q.s.

Above table include the material weighed for 4 cm^2 film area

*%W/W of total film weight

Table 9: Evaluation parameter for B11 to B14 batches.

EVALUATION PARAMETERS	B11		B12		B13		B14	
	I	II	I	II	I	II	I	II
1.Appearance	Good		Moderate		Moderate		Poor	
2.Mechanical Properties:								
Folding Endurance	240	251	109	121	155	139	105	129
Tensile strength(gm/cm^2)	11.20	12.53	5.69	6.60	6.74	5.95	5.89	6.12
% Elongation	12.89	14.65	3.27	4.89	7.55	6.48	4.29	5.56
3.Thickness(mm)	0.10	0.12	0.07	0.08	0.11	0.11	0.08	0.09
4.Surface pH	6.58	6.53	6.43	6.48	6.13	6.16	6.12	6.10
5.Assay	85.39	81.54	79.65	76.25	72.48	74.49	70.52	72.63
6.Disintegration time (sec)	30	32	50	59	45	52	65	73

Table 10: In vitro drug release for B11 to B14.

TIME(min)	% CDR			
	B11	B12	B13	B14
0	0	0	0	0
1	54.12	30.45	27.11	39.75
2	61.75	34.51	32.56	47.96
3	73.98	64.23	51.89	51.55
4	81.10	71.89	73.52	89.42
5	88.09	74.95	78.12	

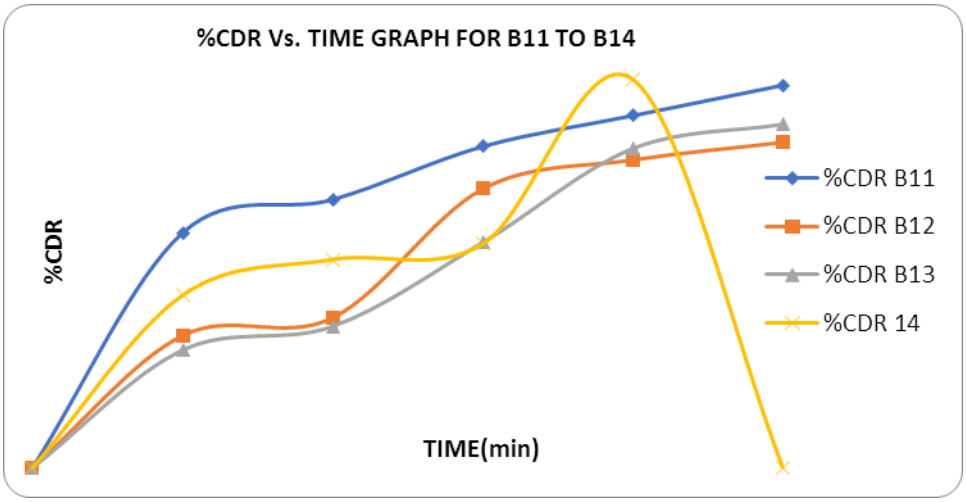

Figure 7: %CDR for Batches B11 to B14.

DISCUSSION

B11 batch contains combination of HPMC E15 and PVA, films formed were smooth and soft tensile strength value was found to be moderate and % elongation value was found to be high (good). The good drug release profile was also good. B12 batch contains combination of HPMCE15 and PVP K30, films formed were found to be smooth and hard. Drug release was less as compare to individual polymer. B13 batch contains combination of HPMC E15 and Xanthan gum, films produced were transparent but white spot were observed on surface of film after a time interval. Drug release was found to be slower than desired. B14 batch contains combination of HPMCE15 and Guar gum. Films produced were soft but white spots are seen within film and tensile strength was poor. Uneven drug release was found. From above results it can be concluded that films prepared by B11 batch acquires desired characteristics. And hence the polymer combination of HPMCE15 and PVA was the optimized one.

3.7 3^2 factorial design was applied to optimized batch

Table 11: Formulation of factorial batches F1 to F9.

INGREDIENTS(mg)	F1	F2	F3	F4	F5	F6	F7	F8	F9
Venlafaxine hydrochloride	25	25	25	25	25	25	25	25	25
HPMC E15	14	16	18	14	16	18	14	16	18
PVA	2	2	2	4	4	4	6	6	6
Propylene glycol	4	4	4	4	4	4	4	4	4
Mannitol	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Citric acid	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Tween 80	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s
Water	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s

Table 12: Evaluation Parameters for F1 to F5.

EVALUATION PARAMETERS	Factorial Batches				
	F1	F2	F3	F4	F5
Appearance	Good	Moderate	Good	Good	Moderate
Separability	++	+	++	++	+
Folding Endurance	171	203	180	265	242
Mechanical Properties					
Tensile Strength (gm/cm^2)*	9.41±0.57	10.65±1.22	12.09±0.33	10.12±0.48	11.29±0.48
% Elongation	10	10	15	15	10
Thickness (mm)*	0.073±0.011	0.086±0.005	0.09±0.01	0.096±0.005	0.010±0.015
Surface pH	6.27	6.48	5.95	6.52	5.87
Disintegration Time (sec)*	11.66±0.57	20.33±0.57	30.33±0.57	14.66±1.52	23.33±0.57
Assay (%)	86.43	81.39	91.65	94.26	89.56

Table 13: In Vitro drug release for F1 to F5.

Time (min)	%CDR				
	F1	F2	F3	F4	F5
0	0	0	0	0	0
1	41.94±0.64	40.23±0.91	46.65±0.64	51.40±0.51	48.69±0.42
2	48.99±0.46	47.17±0.75	53.28±0.60	68.03±0.45	64.90±0.68
3	57.03±0.44	60.91±0.65	73.26±0.63	78.69±0.70	71.01±0.58
4	69.10±0.62	67.02±0.25	80.83±0.31	84.38±0.57	78.98±0.83
5	85.63±0.39	84.95±0.54	86.33±0.44	92.78±0.75	83.82±0.56

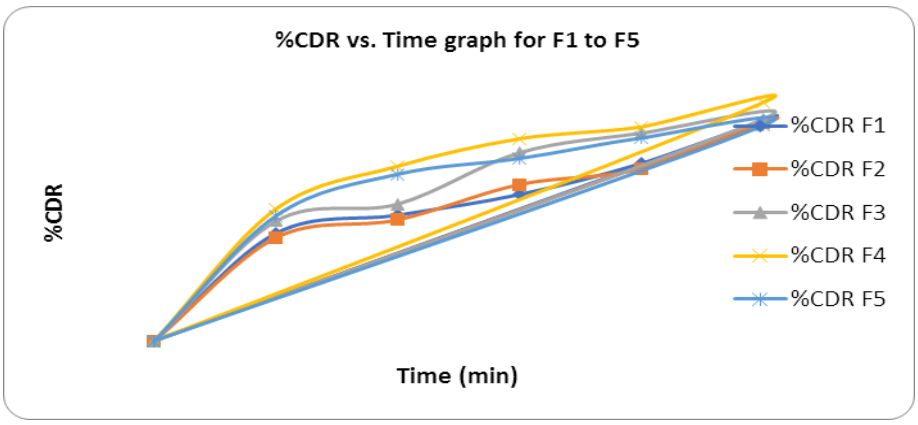

Figure 8: % CDR for batches F1 to F5.

Table 14: Evaluation Parameters for F6 to F9.

EVALUATION PARAMETERS	Factorial Batches			
	F6	F7	F8	F9
Appearance	Good	Moderate	Good	Good
Separability	++	+	++	++
Folding Endurance	285	252	310	322
Mechanical Properties				
Tensile Strength (gm/cm^2)*	12.95±0.57	12.79±0.32	13.69±0.64	14.97±0.81
% Elongation	25	20	20	25
Thickness (mm)*	0.106±0.015	0.116±0.015	0.123±0.005	0.12±0.01
Surface Ph	6.50	6.32	5.98	6.29
Disintegration Time (sec)*	34.33±0.57	19.66±1.52	30.33±0.57	36.33±1.52
Assay (%)	92.86	84.34	95.13	89.04

Table 15: In Vitro drug release for F6 to F9.

Time (min)	%CDR			
	F6	F7	F8	F9
0	0	0	0	0
1	45.97±0.42	43.38±0.48	55.82±0.41	54.83±0.63
2	67.98±0.74	64.90±0.68	66.83±0.83	71.36±0.56
3	75.58±0.73	75.78±0.39	73.02±0.47	79.25±0.40
4	81.03±0.65	83.22±0.60	80.62±0.41	83.09±0.52
5	86.77±0.72	87.69±0.41	82.16±0.71	87.14±0.59

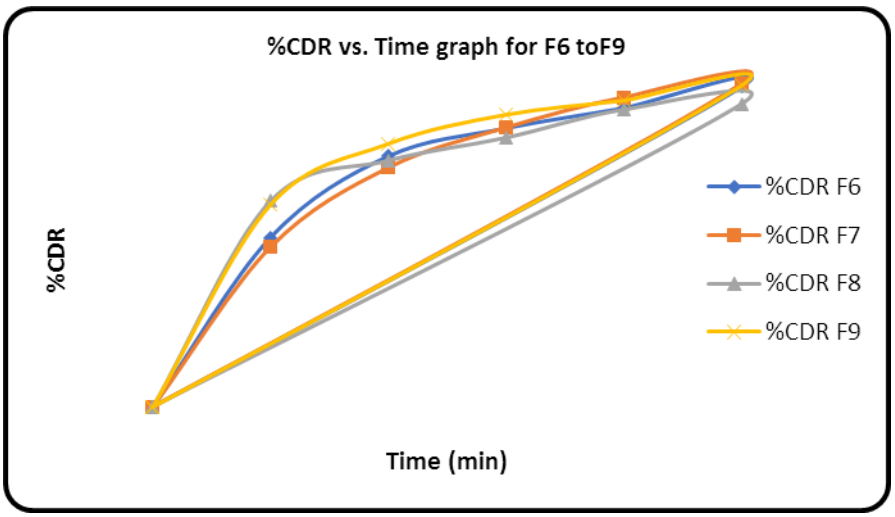

Figure 9: % CDR for batches F6 to F9.

DISCUSSION

Factorial batch F1 produced films having good appearance and were having good separability but tensile strength value was less as compared to other and drug release profile was not desirable. F2 batch produced film with moderate appearance. Factorial batch F3 produced film having good appearance, but here disintegration time measured was also somewhat high.

Factorial batches F5, F6, F7 produced films having somewhat higher disintegration time as compared to F4 batch. F6 curled on edges. And F5, F6, F7 they have good tensile strength. Factorial Batch F9 produced films having very high tensile strength which was not desirable and F8 produce film with moderate tensile strength but disintegration time was somewhat higher as compared to F4. Batch F9 was gave desirable drug release profile due to higher PVA content, but it having higher disintegration time as compared to all other batches because of higher polymer content. Factorial batch F4 has given less disintegration time. Also it having desirable mechanical properties that are comparatively moderate tensile strength and having desirable %elongation that means soft and tough film formulated. Thus F4 considered as an optimized batch. Also it releases the drug in a desirable manner.

3.8 Stability Study

Stability studies were done according to ICH guidelines. The stability studies were carried out on the optimized satisfactory formulations as per ICH guidelines. The optimized formulation after factorial design batch F4 was sealed in aluminum foil packaging and kept in humidity chamber at fixed temperature and humidity. Here stability study was carried out in accelerated conditions at 40 ± 2? C and 75 ± 5% RH for 1 month.

Table 16: Evaluation after one month.

Evaluation parameters		**Batch F4**	
	Initial Data		**After 1 month**
Appearance	Good		Good
Separability	++		-
Folding Endurance	260		249
Mechanical Properties			
Tensile Strength (gm/cm^2)	10.12		9.58
% Elongation	15		15
Thickness (mm)	0.096		0.10
Surface pH	6.52		6.49
Disintegration Time (sec)	14.66		15
Assay (%)	94.26		93.69

Table 17: In vitro drug release before and after.

Time (min)	**%CDR (F4 Batch)**	
	Initial Data	**After 1 month**
0	0	0
1	51.40	53.56
2	68.03	66.51
3	78.69	75.23
4	84.38	81.12
5	92.78	89.98

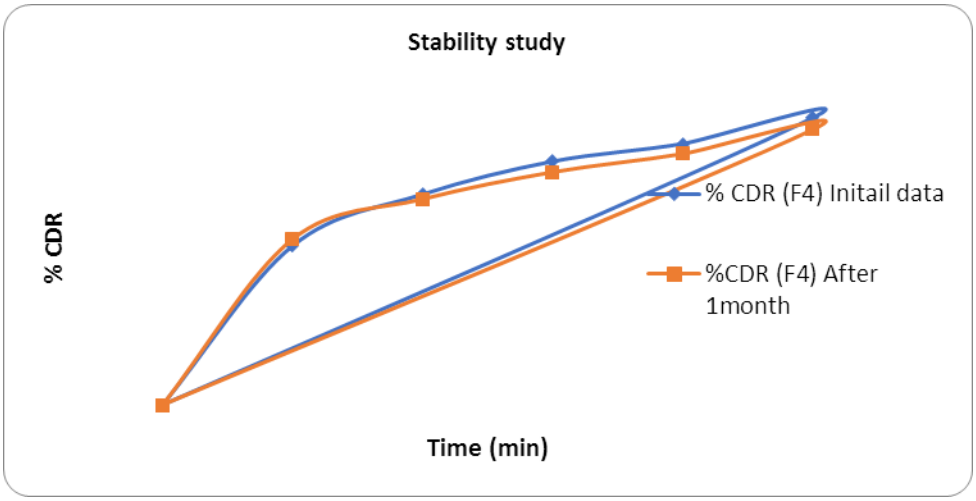

Figure 10: %CDR vs. Time Graph for Batch of stability study.

From the above stability data at 40°C/75%RH, shows that there was no significant difference in %CDR of the formulation F4 before and after a month results. This concluded that the optimized formulation has sufficient stability at 40°C and 75% RH and extrapolated that formulation was stable at room temperature. So, the formulation after one month was found to be stable.

4. CONCLUSION

According to various batches formulated, it was concluded that amongst Preliminary batches B1 to B5 (plasticizer and its concentration) batch B4 containing PG was optimized as plasticizer as it produced clear and smooth film with good elasticity and folding endurance. From B6 to B10 (single polymer batches) no one was able to produce film with desired properties. So, Batches B11 to B14 were formulated that had combination of Polymer. From that B11 batch was optimized one which contained combination of polymer HPMC E15 and PVA. Then 32 factorial designs were applied and all the F1 to F9 batches were evaluated. Factorial batch F4 was concluded as optimized batch by taken in consideration of different evaluation parameters which have desired properties. Factorial batch F4 had contained HPMC E15 and PVA in 14mg and 4mg quantity respectively in a combination. Optimized batch F4 was kept for stability study for a month and readings were taken after one month.

The optimized batch produced the film containing drug Venlafaxine hydrochloride was having desired disintegration time and mechanical properties that is potentially useful for the treatment of depression where faster onset of action is required.

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