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Formulation and Evaluation of Polyethylene Glycol Reserpine solid dispersion containing fast dissolving Film for the treatment of Hypertension

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Abstract

The current work was investigated to augment the solubility and dissolution of the anti-hypertensive drug reserpine. The current study comprised development and optimization the reserpine-polyethylene glycol solid dispersion containing fast dissolving film using QBD approach for the treatment of the hypertension. The reserpine solid dispersion was prepared using the PEG 20000 through carrier fusion method. In preliminary screening two parameters amount of the PEG 20000 and amount of reserpine was selected for the optimization. The central composite response surface design employed to suggest a total 13 trial formulations of the reserpine-poly ethylene glycol solid dispersion for the following independent variables: amount of PEG 20000 (80mg and 160mg) and reserpine amount (2mg and 6mg) were adjusted to three different levels. Dissolution of the reserpine from the solid dispersion at 20min and the percentage solubility of each batch were measured. The new optimized solid dispersion (DRPSD14), which served as a check point, was obtained using a numerical optimization technique based on desirability techniques. The amount of reserpine (X1) and PEG 20000 (X2) that were used in the formulation of the optimal solid dispersion were 3.66 mg and 124.88 mg, respectively, yielding theoretical values of 14.94% percent solubility and 96.88% percent dissolution at 20 minutes, respectively. DRPSD14 containing fast dissolving film was prepared employing solvent casting. Different parameters like amount of HPMC, amount of plasticizer and their type were investigated over the characterization parameters of the fast-dissolving film. Twelve different formulation was prepared and characterized. The surface pH of tailored formulation was discovered between 6.83 and 7.19, lies close to neutral pH, indicating non irritating sublingual mucosa and, thus, be more accepted by the patients. Percentage drug content of all manufactured formulations, which ranged from 91.082±1.540% to 98.977±0.253%, demonstrating the drug's uniform distribution within the polymer film. Formulation DRPSD14FDF11, which includes all formulations, contains the most reserpine (98.977±0.253%) of any of them. Reserpine-polyethylene glycol fast dissolving film formulations DRPSD14FDF11 in vitro dissolution studies showed quick dissolution up to or more than 90% within 6 minutes.

Key words: **Reserpine, Poly ethylene glycol, Glycerol**

Abbrevations: (BCS) biopharmaceutical categorization system, GIT(gastro intestinal tract)

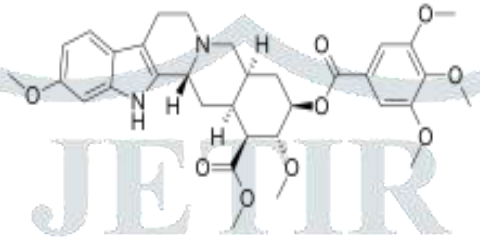
1. Introduction

Two strand namely aqueous solubility and permeability used by the biopharmaceutical categorization system (BCS) to divide the drugs into four categories. Class II drugs fall under the heading of low solubility and high permeability.

For BCS class II drugs, bioavailability of the orally administered drug controlled by the release. As a result, by optimising the release, it is doable to increase bioavailability and curtail side effects. Solubility and dissolution both have an impact on how well BCS class II drugs are absorbed . Drug solubility can be increased chemically (prodrug) or through formulation like solutions and suspensions of drugs that aren't very water soluble, prospering like nanosuspensions, solid dispersions, or lipid-based formulations, adjusting the pH, creating molecular complexes, using surfactants and co-solvents

2.Drug and excipient profile

Reserpine



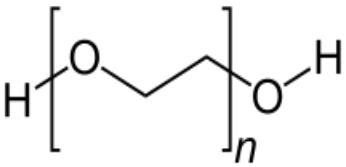
Physicochemical properties

- Chemical Formula: $C_{33}H_{40}N_2O_9$
- Molecular weight: 608.688 g·mol^{-1}
- Melting point: 264.5°C
- Solubility: It appears as an crystalline powder with light colour and odourless and did not solubilize to the water but displayed solubility in chloroform and acetic acid and less soluble in alcohol. Furthermore it has dissociation constant 6.6 and its aqueous solution is getting destabilize under presence of the alkali.

Pharmacokinetic data

- Oral Bioavailability: 50%
- Location of Metabolism: Gut/liver
- Plasma Elimination half-life: phase 1 = 4.5h,
  phase 2 = 271h,
  Average = 33h
- Excretion: 62% feces / 8% urine

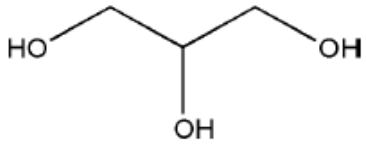
Poly ethylene glycol



Specification of the PEG20000

Test Parameters	Standards	Actual Results
Physical texture (Colour)	White	White
State (Form)	Powder	Flakes
Solubility (Turbidity) 10% aq. solution	Clear	Clear
Solubility (Colour) 10% aq. solution	Colourless	Colourless
pH (5% aq. solution)	6.5 - 8.0	6.5
Melting Point	63 - 65°C	64°C
Viscosity (25%aq, 20°C) ~	100 cs	97 cs

Glycerol :



Typical properties

- Boiling point: 290°C (with decomposition)
- Density:
  1.2656 g/cm^3 at 15°C;
  1.2636 g/cm^3 at 20°C;
  1.2620 g/cm^3 at 25°C.
- Flash point: 176°C (open cup)
- Hygroscopic
- Melting point: 17.8°C
- Osmolarity: a 2.6% v/v aqueous solution is isoosmotic with serum.
- Surface tension: 63.4mN/m (63.4 dynes/cm) at 20°C.
- Vapor density (relative): 3.17 (air = 1)

3.Result and Discussion

- **Melting Point Determination**
- Reserpine has a melting point between 263±1.00°C to 265.33±1.15°C , which is extremely similar to the 264–265°C range reported in the literature.
- **Partition coefficient Determination**
- Reserpine's partition coefficient, which was calculated employing shake flask method in a solution of water and n-octanol, was 8.416±0.548. This value is extremely similar to the literature-reported value of 8.0 and demonstrates the drug's lipophilic nature.

- **Determination of absorption maxima of reserpine in methanol**
- A working solution of concentration 25µg/m solution of reserpine in methanol between 200 and 400 nm was scanned employing UV-VIS functionalized spectrophotmeter. According to figure 7.1, the absorption maxima in methanol were discovered to be 293nm and 268nm.

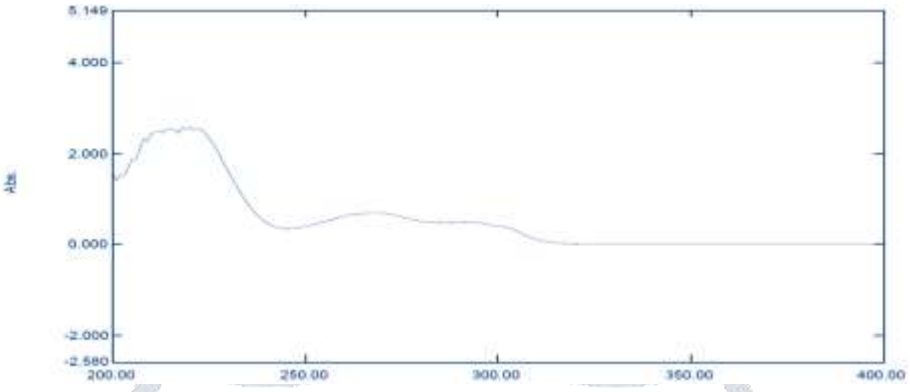


Figure 1 : UV absorption spectra of Reserpine in methanol (25µg/ml)

Table 1: Repeatability data of Reserpine in methanol at 293nm

Concentration (µg/ml)	% Recovery	% Mean Recovery	STD	%RSD
20	99.668	99.668	0.228	0.229
	99.923			
	99.668			
	99.413			
	99.413			
	99.923			

Table 2: Repeatability data of Reserpine in methanol at 268nm

Concentration (µg/ml)	% Recovery	% Mean Recovery	STD	%RSD
20	99.649	99.649	0.111	0.111
	99.825			
	99.649			
	99.649			
	99.474			
	99.649			

Interday Precision data of Reserpine in methanol at 293nm:

Day 1				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.413	99.371	0.192	**0.193**
20	99.158			
20	99.668			
20	99.413			
20	99.158			
20	99.413			

Day 2				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.158	99.413	0.228	**0.230**
20	99.413			
20	99.668			
20	99.413			
20	99.158			
20	99.668			
Day 3				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.413	99.541	0.312	**0.314**
20	99.923			
20	99.923			
20	99.413			
20	99.158			
20	99.413			
Day 4				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.158	99.626	0.442	**0.444**
20	99.158			
20	99.923			
20	99.668			
20	99.923			
20	99.923			
Day 5				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.158	99.626	0.390	**0.391**
20	99.413			
20	99.923			
20	99.923			
20	99.668			
20	99.668			
Day 6				
Conc.(µg/ml)	**% Recovery**	**Mean % Recovery**	**STD**	**%RSD**
20	99.668	99.668	0.147	**0.148**
20	99.923			
20	99.923			
20	99.923			
20	99.158			
20	99.413			

Robustness

Robustness assessed by examining alteration of ±1nm in the analysis's wavelength. The test sample solution was produced in six replicates at the same concentration (20µg/ml), and the assays were conducted using both 268nm and 293nm wavelengths. The approach was determined to be robust and the% RSD values were found to be within the limitations (2%) as indicated in Table 7.10-7.11.

Table 3: Percentage recovery of reserpine in robustness parameter in methanol at 293nm

Wavelength 292nm				
Conc.(µg/ml)	**% Recovery**	**% Mean Recovery**	**STD**	**%RSD**
20	99.158	99.541	0.268	**0.269**
20	99.413			
20	99.668			
20	99.923			
20	99.668			
20	99.413			
Wavelength 293nm				
Conc.(µg/ml)	**% Recovery**	**% Mean Recovery**	**STD**	**%RSD**
20	99.923	99.456	0.298	**0.300**
20	99.413			
20	99.413			
20	99.158			
20	99.158			
20	99.668			
Wavelength 294nm				
Conc.(µg/ml)	**% Recovery**	**% Mean Recovery**	**STD**	**%RSD**
20	99.413	99.741	0.289	**0.290**
20	99.923			
20	99.923			
20	100.102			
20	99.413			
20	99.668			

In-vitro characterization parameters

S. No.	Formulation code	Visual appearance	Percentage yield (%)	Percentage drug content (%)	Percentage solubility (%)	Percentage dissolution at 20min (%)
1	RPSD9	Off white powder	99.399±0.310	92.398±1.104	8.611±0.091	80.117±1.340
3	RPSD4	Off white powder	99.220±0.283	95.468±0.607	12.339±0.023	97.368±0.877
4	RPSD10	Off white powder	99.497±0.279	90.936±0.506	7.690±0.134	77.485±0.506

Solid dispersions comprising varying reserpine drug amount were created employing the fusion method in an effort to escalate solubilization of active pharmaceutical ingrentients and behavior during tailored process dissolution. The percentage of reserpine dissolved over time from its solid dispersion formulations is shown in Table 7.18. By forming dispersions with variable amounts of reserpine, the effects of these variations in reserpine concentration were examined (2mg, 4mg, 6mg). It is evident that up to a concentration of 4 mg of reserpine (12.339±0.023% and 97.368±0.877%), the solubilization with dissolution of reserpine augment with increasing concentration. However, at higher concentrations, the solubilization and dissolution rate of reserpine decreases. Similar findings have been demonstrated to the creation of a polymer outer layer regulates release of active

ingreidents, a continuous drug layer, or the discharge of intact particles from which disintegration spreads across a wide area. The percentage drug concentration was observed to range from 92.398±1.104% to 95.468±0.607% .

At greater drug concentrations (6 mg), the drug, once freed from the dispersion, controls the dissolving rather than the polymer. According to the theory, dissolution begins quickly as the PEG 20000 on the disc's surface dissolves but then slows down due to the substantial amount of drug already present in the dissolution media. Further to screen the parameters comprising process, the drug concentration of 4 mg was used.

Effect of different amount of poly ethylene glycol

As shown in table 7.17, different polyethylene glycol 20000 concentrations (4 mg to 160 mg) were investigated to create the reserpine-loaded solid dispersions. The prepared solid dispersions were assessed using in vitro characterization parameters like percentage yield, solubility of the reserpine, and percentage dissolution at 20 min.

Table 4 : In-vitro characterization

S.No.	Formulation code	Visual appearance	Percentage yield (%)	Percentage drug content (%)	Percentage solubility (%)	Percentage dissolution at 20min (%)
1	RPSD5	Off white powder with drug crystal	74.394±0.473	34.839±0.755	3.874±0.141	44.737±1.754
2	RPSD6	Off white powder	97.738±0.315	91.082±1.104	9.576±0.091	72.515±1.340
3	RPSD7	Off white powder	98.902±0.460	93.567±1.104	10.278±0.067	88.889±1.826
4	RPSD4	Off white powder	99.220±0.242	95.468±0.670	12.339±0.024	97.368±0.877
5	RPSD8	Off white powder	99.330±0.279	90.205±0.913	8.319±0.134	85.673±0.506

Figure 2 : Solid dispersion under presence of different amount of poly ethylene glycol

Percentage dissolution at 20min.

ANOVA

Table displays the results of ANOVA

Table 5: ANOVA for the response percentage dissolution at 20min.

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	453.371	5	90.67421	331.6419	< 0.0001	Significant
X1-Amount of drug	3.27554	1	3.27554	11.98032	0.0105	
X2-Amount of PEG	2.55931	1	2.55931	9.360704	0.0183	
X1X2	32.54703	1	32.54703	119.0411	< 0.0001	
$X1^2$	216.8029	1	216.8029	792.959	< 0.0001	
$X2^2$	252.1155	1	252.1155	922.1151	< 0.0001	
Residual	1.91387	7	0.27341			
Lack of Fit	0.121849	3	0.040616	0.090661	0.9614	Not significant
Pure Error	1.792021	4	0.448005			
Cor Total	455.2849	12				
Std. Dev.	0.522886		R-Squared	0.995796		
Mean	89.87508		Adj R-Squared	0.992794		
C.V. %	0.581792		Pred R-Squared	0.991947		
PRESS	3.666516		Adeq Precision	44.08589		

The model significance is governed by Model F-value of 331.64. X1, X2, X1X2, $X1^2$, and $X2^2$ are significant model term because its F-Values is less than 0.1000. Since we want the model to fit, a non-significant lack of fit is good. The "Pred R-Squared" of 0.9919 and the "Adj R-Squared" of 0.9928 are significantly in agreement. Signal-to-noise ratio is measured using "Adeq Precision" with a minimum value is 4 . In current case the value is 44.086 displayed the significanc of the process. To move around the design space, utilise this model. The following is the multiple regression equation:

Percentage dissolution at 20min. = $97.015-0.63X1+0.56X2+2.85X1X2-5.58X1^2-6.02X2^2$

The results of the analysis of multiple linear regression show that coefficient β1 bears a negative sign, indicating the antagonistic action of variables toward the response percentage dissolution, while coefficient β2 bears a positive sign, indicating the synergistic action of variables toward the percentage solubility. Therefore, increasing the amount of either PEG is anticipated to increase the percentage dissolution up to a certain amount; further, enhancement would not affect reserpine's ability to dissolve; however, increasing the amount of the drug would increase the percentage solubility up to a certain amount; however, as shown in the interaction plot and three-dimensional response surface plots in Figure 7.9, beyond that point, the percentage solubility decreases. To investigate the effect of each ingredients and their combined interaction over the response, the three dimensional response surface plots demonstrated in Figure 7.9.

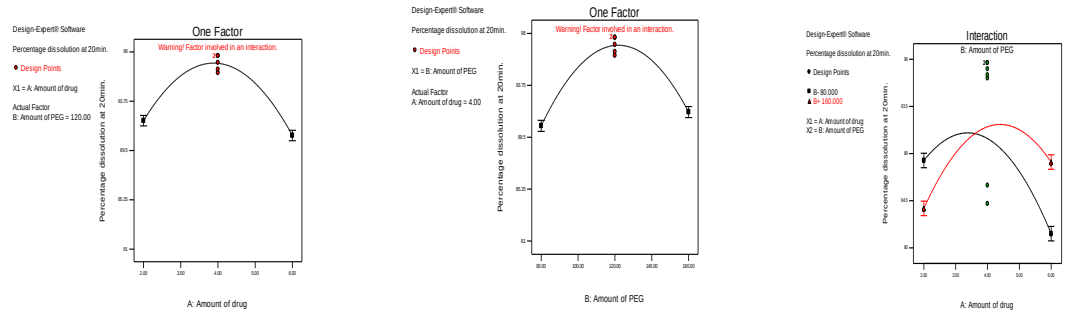


Figure 3: Effect of the single variables and combination of variables over the percentage dissolution at 20min.

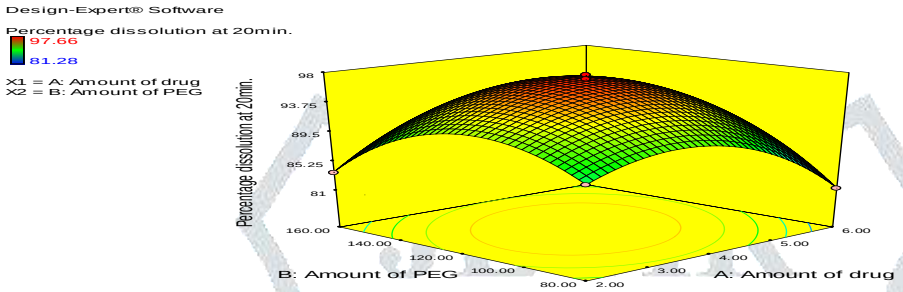


Figure 4: 3D response graph

Diagnostics case statistics actual value and predicated value

Standard Order	Actual Value	Predicted Value	Residual
1	88.30	88.34	-0.039
2	81.28	81.35	-0.074
3	83.62	83.77	-0.145
4	88.01	88.19	-0.180
5	86.84	86.75	0.085
6	85.08	84.95	0.134
7	84.21	84.18	0.034
8	85.96	85.77	0.185
9	97.66	97.02	0.644
10	96.19	97.02	-0.825
11	97.66	97.02	0.644
12	96.49	97.02	-0.525
13	97.08	97.02	0.060

The new optimized solid dispersion (DRPSD14), which served as a check point, was based on desirability techniques. To assess the response surface central composite design's capacity for optimization.

The amount of reserpine (X1) and PEG 20000 (X2) comprising the optimal solid dispersion were 3.66 mg and 124.88 mg, respectively, yielding theoretical values of 14.94% percent solubility and 96.88% percent dissolution at 20 minutes, respectively.

To create a new formulation, the ideal values of the independent variables were used. The observed percentages of solubility and dissolution at 20 minutes were found to be 14.668±0.127 and 97.07±0.506, respectively.

Table 6: Composition of the optimized formulation with the theoretical value of the percentage solubility and percentage dissolution.

Formulation code	Amount of drug (mg)	Amount of PEG (mg)	Percentage solubility (%)	Percentage dissolution at 20min. (%)
DRPSD14	3.66	124.88	14.946	96.881

Table7 : Composition of the optimized formulation with actual value of the percentage solubility and percentage dissolution

Formulation code	Theoretical Percentage solubility (%)	Theoretical Percentage dissolution at 20min. (%)	Actual Percentage solubility (%)	Actual percentage dissolution at 20min. (%)
DRPSD14	14.946	96.881	14.668±0.127	97.076±0.506

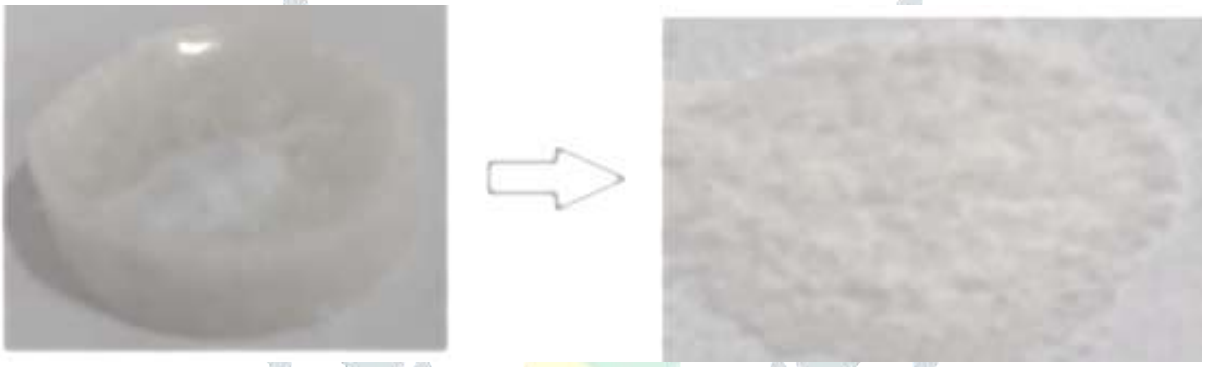


Figure 5: Image of optimized formulation DRPSD14

In Vitro characterization of the

Physical appearance

The physical characteristics of the finished formulation are displayed in table.

Table 8: Physical appearance of all tested formulations

Formulation code	Physical appearance
DRPSD1	Off white powder
DRPSD2	Off white powder
DRPSD3	Off white powder
DRPSD4	Off white powder
DRPSD5	Off white powder
DRPSD6	Off white powder
DRPSD7	Off white powder
DRPSD8	Off white powder
DRPSD9	Off white powder
DRPSD10	Off white powder
DRPSD11	Off white powder
DRPSD12	Off white powder
DRPSD13	Off white powder
DRPSD14	Off white powder

On visual inspection, all manufactured formulas appear to be off white.

Percentage yield

Table displays the percentage yield for all prepared formulations.

Table 9: Percentage yield

Formulation code	Percentage yield (%)
DRPSD1	99.409±0.305
DRPSD2	99.597±0.161
DRPSD3	98.821±0.307
DRPSD4	98.815±0.212
DRPSD5	99.435±0.213
DRPSD6	99.543±0.203
DRPSD7	98.876±0.374
DRPSD8	98.926±0.277
DRPSD9	97.630±0.521
DRPSD10	98.868±0.731
DRPSD11	99.033±0.311
DRPSD12	99.574±0.200
DRPSD13	99.642±0.201
DRPSD14	99.061±0.441

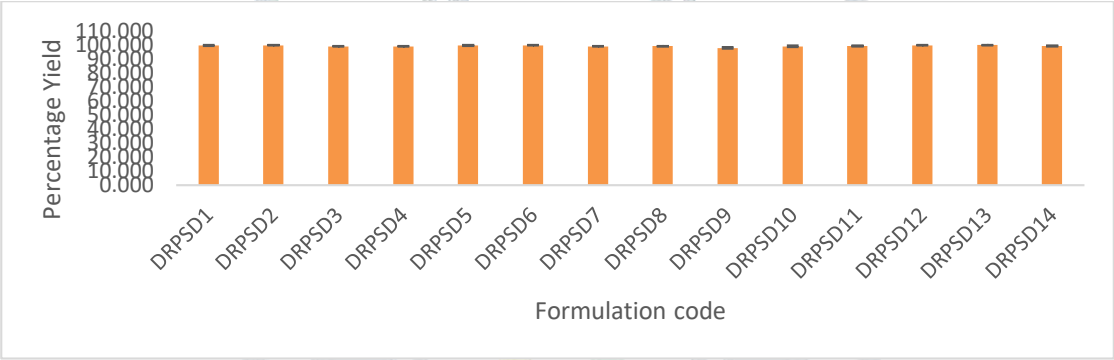


Figure 6: Percentage yield of the all prepared formulations

In vitro characterization of the reserpine-polyethylene glycol loaded fast dissolving patch

Physical appearance and film forming capacity

The physical characteristics and ability to form films of the polymer depicted in table 7.33were examined for each prepared formulation.

Table 10 : Physical appearance and film forming capacity

Formulation Code	Visual Observation	Film forming Capacity
DRPSD14FDF1	Homogeneous, Uniform, Flexible, Smooth little brittle and break down during peeling	Less
DRPSD14FDF2	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF3	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF4	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF5	Homogeneous, Uniform, little brittle and break down during peeling	Less
DRPSD14FDF6	Homogeneous, Uniform, Nonstick and Easily peel out	Good

DRPSD14FDF7	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF8	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF9	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF10	Homogeneous, Uniform, little brittle and break down during peeling	Less
DRPSD14FDF11	Homogeneous, Uniform, Nonstick and Easily peel out	Good
DRPSD14FDF12	Homogeneous, Uniform, sticky and difficulty to peel out	Less

The physical characteristics and ability to form films of the polymer depicted in table 7.33 were examined for each prepared formulation.

Except for the formulations DRPSD14FDF1, DRPSD14FDF10, and DRPSD14FDF12, which were either challenging to peel out or broke down during the peeling out from the petri dish, all prepared reserpine loaded fast dissolving formulations were homogeneous, uniform, nonstick, and easily peel out [280].

Thickness

Table shows the locations of each formulation's thickness measurements.

Table 11: Thickness of the prepared formulations

Formulation Code	Thickness (mm)
DRPSD14FDF1	1.365±0.023
DRPSD14FDF2	0.493±0.006
DRPSD14FDF3	0.560±0.025
DRPSD14FDF4	0.747±0.030
DRPSD14FDF5	0.512±0.010
DRPSD14FDF6	0.593±0.008
DRPSD14FDF7	0.627±0.004
DRPSD14FDF8	0.614±0.003
DRPSD14FDF9	0.494±0.001
DRPSD14FDF10	0.511±0.009
DRPSD14FDF11	0.522±0.007
DRPSD14FDF12	0.528±0.008

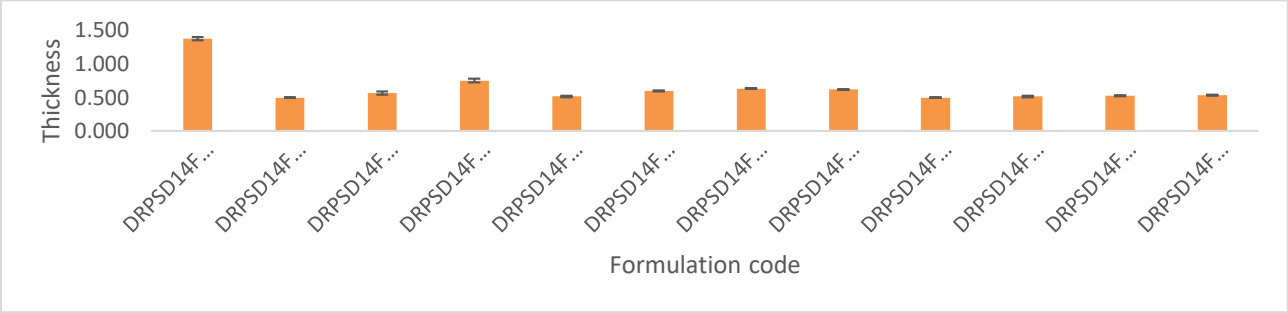


Figure 7: Thickness of the all prepared formulations

The thickness of tailored formulations at various sites of each formulation was measured in a range of 0.493±0.006 to 1.365±0.023, with a very little margin of variability, indicating the film's high degree of homogeneity (Table 7.40). Having

equal thickness across the film is essential since it directly affects how accurately the dose is represented on the film. The thickness of the film varies according to the physicochemical properties of the plasticizer. The created rapid dissolving film's thickness increases with an increase in all three parameters. In order to conduct the in vitro dissolving investigation, formulation DRPSD14FDF11 was chosen since HPMC E15's thickness is within acceptable limits.

In vitro dissolution study

In vitro dissolution properties of control patch containing pure drug reserpine, DRPSD14FDF9, and DRPSD14FDF11 were assessed in simulated salivary fluid pH 6.8 without enzyme. Based on the hypothesis that drug release and subsequent oral absorption in the oral cavity may increase the bioavailability of reserpine, dissolution at salivary pH was accompanied to evaluate the release of drug from the film at pH 6.8. Table 7.40[288] compares the in vitro drug release profiles of the reserpine-poly ethylene glycol fast dissolving film formulations DRPSD14FDF9 and DRPSD14FDF11 with the control patch containing pure drug reserpine.

Table 12: Comparison of the In-vitro dissolution profile of the reserpine-poly ethylene glycol fast dissolving film formulations DRPSD14FDF9, DRPSD14FDF11 and control patch containing pure drug reserpine

Time(min.)	Percentage drug release of control patch	Percentage drug release of DRPSD14FDF9	Percentage drug release of DRPSD14FDF11
0	0.000±0.00	0.000±0.00	0.000±0.00
0.25	18.13±1.01	20.18±0.88	21.64±1.34
0.5	22.22±1.83	24.59±0.05	40.64±0.51
1	34.21±0.88	32.46±0.99	48.83±1.83
2	38.01±1.34	40.06±1.34	64.91±1.52
3	39.18±1.01	56.14±1.75	84.21±0.88
4	40.35±0.67	69.01±1.48	93.57±1.44
5	42.69±1.10	78.95±1.75	96.49±0.75
6	43.86±0.96	81.58±0.60	97.95±0.48

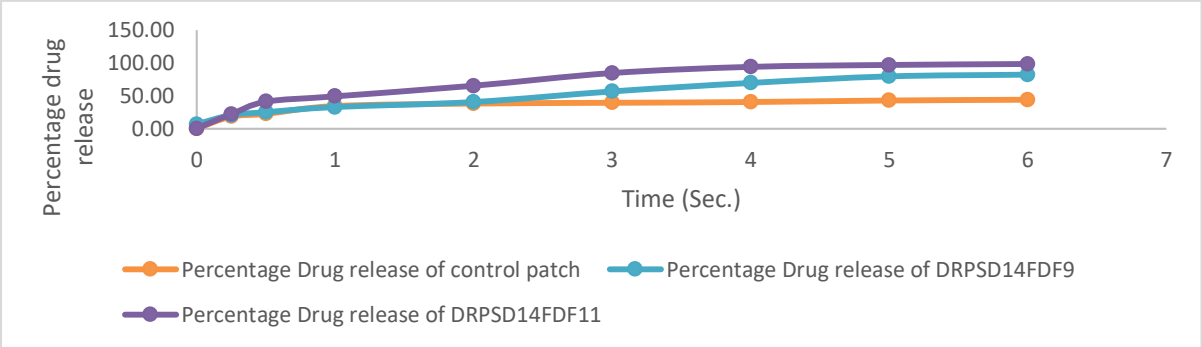


Figure 8 : Linear graph of the comparison of the In vitro dissolution profile of the reserpine-poly ethylene glycol fast dissolving film formulations DRPSD14FDF9, DRPSD14FDF11 and control patch containing pure drug reserpine

In vitro drug release kinetic study

Various models were used to estimate the DRPSD14FDF11 formulation's in vitro drug release profile.

Zero Order

Figure 7.23 depicts the zero order model of the DRPSD14FDF11 formulation's in vitro drug release profile.

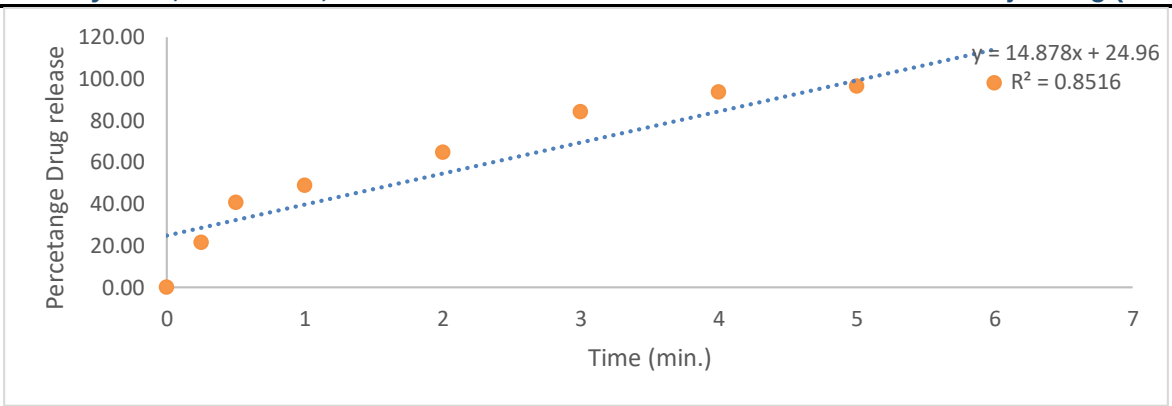


Figure 9 : Zero Order of release profile of formulation DRPSD14FDF11

First Order

Figure 7.24 depicts the first order model of the DRPSD14FDF11 formulation's in vitro drug release profile.

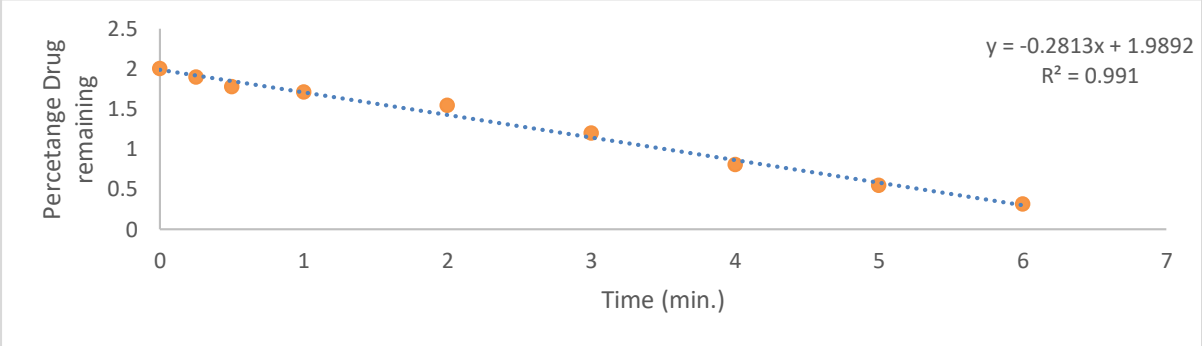


Figure 10: First Order of release profile of formulation DRPSD14FDF11

FTIR spectroscopy

Interaction between the drug and excipients was identified using the FTIR spectrum of reserpine, poly ethylene glycol 20000, a physical mixture of reserpine and poly ethylene glycol, optimal formulation DRPSD14, and optimized fast dissolving film DRPSD14FDF11.

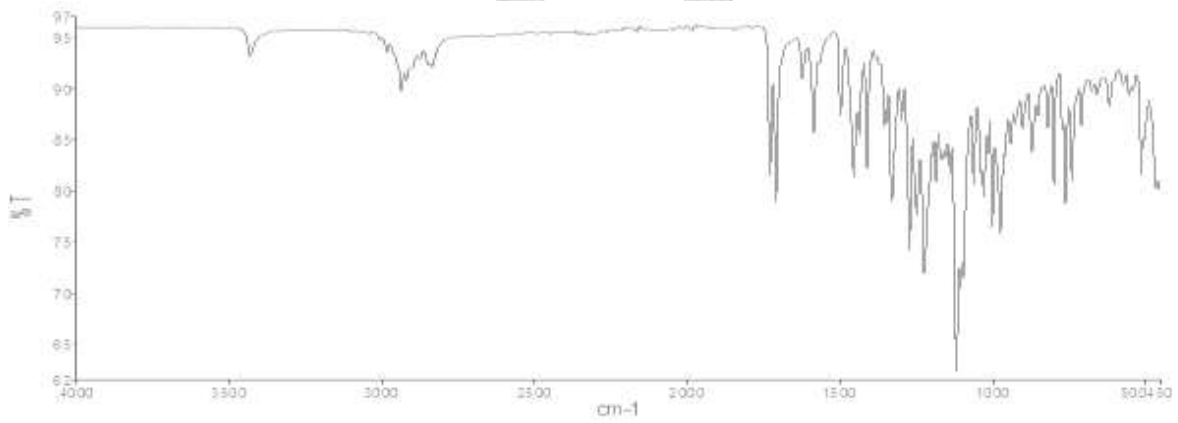


Figure 11: FTIR spectrum of the drug reserpine

Scanning electron microscopy

Figure 7.34-7.35 depicts scanning electron microscopic pictures of the formulation DRPSD14. Images showed that the solid dispersion particles were uniformly and thoroughly blended, with a smooth surface that contained tiny flakes. According to SEM images, effective SDs systems were formed since the surface characteristics of PEG 20000 and reserpine were diminished during formulation process. Reserpine was homogeneously diffused throughout the polymer, as evidenced by the surface morphology of SDs [253]. SEM analysis of the surface morphology of the formulation DRPSD14FDF11 revealed that the drug was distributed uniformly with in the tailored formulation with is no accumulation of drug crystals. The SEM image reveals no striations or fractures in the film, indicating tailored formulation not possess mechanical property issues and won't cause any striations [291].

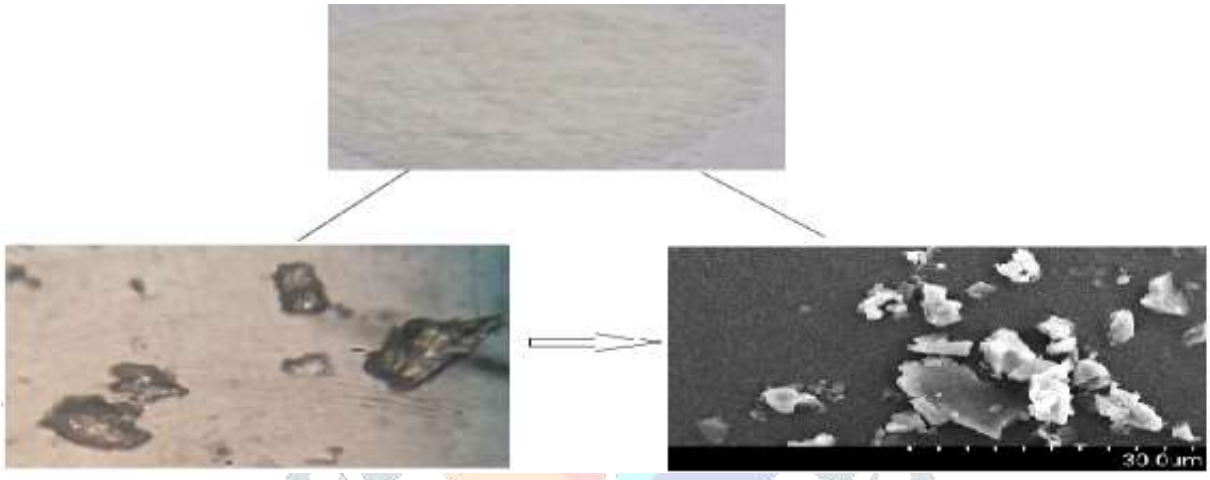


Figure 12: SEM images of the formulation DRPSD14

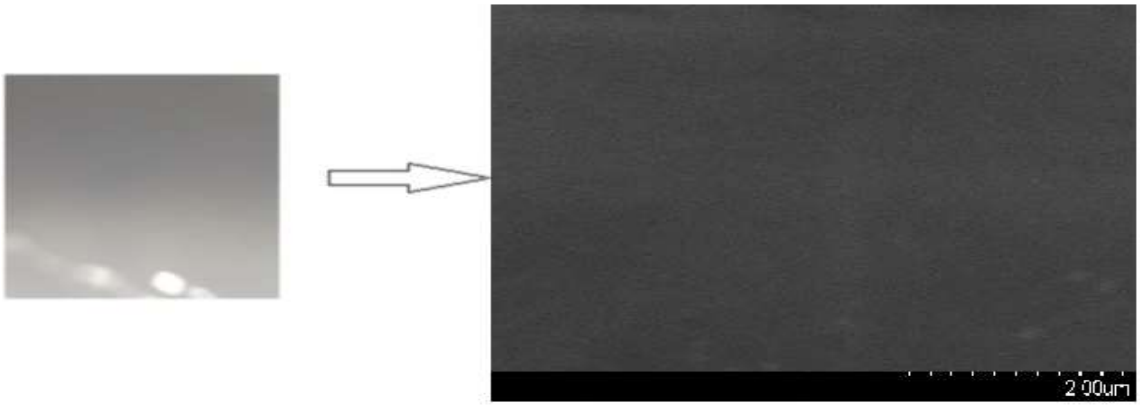


Figure 13 : SEM images of the formulation DRPSD14FDF11

Percentage drug content

Table displays the percentage drug content of the formulation DRPSD14FDF11 under various storage conditions.

Table13 : Percentage drug content at storage condition

Time period (month)	Percentage drug content at Storage condition		
	2-8°C	25°/60%RH	40°C/75%RH
0th month	98.977±0.253	98.977±0.253	98.977±0.253
1st month	98.684±0.438	98.830±0.250	98.099±0.669
3rd month	98.538±1.012	97.661±0.913	97.953±1.103
6th month	97.368±0.877	97.222±0.253	97.076±0.210

At various storage conditions, the customized formulation did not show a discernible variation in the percentage drug concentration.

4. Conclusion:

Reserpine is a pure crystalline single alkaloid.Much smaller doses of Reserpine are required to obtain the hypotensive action. The current work was investigated to augment the solubility and dissolution of the anti-hypertensive drug reserpine. The current study comprised development and optimization the reserpine-polyethylene glycol solid dispersion containing fast dissolving film using QBD approach for the treatment of the hypertension.

5. References

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