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Original Research Article

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Formulation and evaluation of once a day matrix tablets of Valsartan

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Abstract

The objective of the research investigation was to design and evaluate the oral once a day matrix tablets of valsartan by using various natural matrix former gums such as separately. Initially natural gums are extracted and purified and their extracts are evaluated for their proximate phyto-chemical studies. Tablets were prepared by wet granulation method. The prepared tablets were further evaluated for physical parameters, In-vitro dissolution, and drug-excipients interactions are also carried out. The FT-IR studies revealed that there was no chemical interaction between drug and excipients. Among all prepared formulations, formulation F-8 exhibited precise controlled release of drug over a prolonged period of 24 hrs. The in- vitro dissolution data obtained for various formulations were fitted into zero order, first order, Higuchi's and Korsymeyer - Peppas kinetic models. The optimized formulation displayed zero order release kinetics and Korsmeyer and Peppas equation give release pattern with values of (n = 0.9094) indicating non-fickian (or) Anomalous types of diffusion takes place through matrix of Gum Kondagogu. The optimized formulations F-8 was subjected to stability studies for three months at 40^0C/75%RH as per ICH guidelines and result does not shows any change in physical parameters and in-vitro release studies.

Keywords: valsartan; FT-IR studies; Caco-2; permeability; absorption enhancement

Introduction

Most conventional oral drug products, such as tablets and capsules, are formulated to release the active drug immediately after oral administration, to obtain rapid and complete systemic drug absorption. Such *immediate-release products* result in relatively complete systemic drug absorption and onset of accompanying pharmacodyanmic effects. However, after absorption of the drug from the dosage form is complete, plasma drug concentration decline according to the drug's pharmacokinetic profile [1]. Eventually, plasma drug concentrations fall below the minimum effective plasma concentration (MEC), resulting in loss of therapeutic activity. Before this point is reached, another dose is usually given if a sustained therapeutic effect is desired. An alternative to administering another dose is to use a dosage from that will provide sustained drug release, and therefore maintain plasma drug concentrations, beyond what is typically seen using immediate-release dosage forms. In recent years, various modified-release drug products have been developed to control the release rate of the drug and / (or) the time for drug release [2].

Types of Modified Release Drug Products

Several types of modified –release drug products are recognized [4].

Extended-Release Drug Products: A dosage form that allows at least a twofold reduction in dosage frequency as compared to that drug presented as an immediate-release (conventional) dosage form. Examples of extended-release dosage forms include controlled-release, sustained-release, and long acting drug products.

Delayed-Release Drug Products: A dosage form that releases a discrete portion or portions of drug at a time (or) at times other than promptly after administration, although one portion may be released promptly after administration. Enteric-coated dosage forms are the most common delayed-release products.

Targeted-Release Drug Products: A dosage forms that release drug at or near the intended physiologic site of action. Targeted-release dosage forms may either immediate (or) extended- release characteristics.

The term *controlled-release drug product* was previously used to describe various types of oral extended-release-rate dosage forms, including sustained-release, sustained action, long-action, slow-release, and programmed drug delivery.

Matrix Tablets

One of the least complicated approaches to the manufacture of controlled release dosage forms involves the direct compression of blend of drug, retardant material and additives to formulate a tablet in which the drug is embedded in a matrix of the retardant. Alternatively drug and retardant blend may be granulated prior to compression. Matrix tablets is a promising approach for the establishment of extended release drug therapy as tablets offer the lowest cost approach to sustained and controlled release and sustained release solid dosage forms[20]

Matrix tablets may be defined as the "oral solid dosage forms in which the drug (or) active ingredient is homogeneously dispersed throughout the hydrophilic (or) hydrophobic matrices which serves as release rate retardants [21]. These systems release drug in continuous manner by dissolution-controlled and diffusion-controlled mechanisms. Under gastric pH conditions, matrix tablet slowly erodes. However at a pH corresponding to the upper small intestine, the tablet disintegrates rapidly to reduce coated particles, which in turn slowly releases drug. Two different release mechanisms are operative, either of which is zero order erosion and decreasing surface area, and dissolution of coated particles, but the overall tablet release profile comprising the two mechanisms in sequence is nearly linear for most of the dose in the tablet. The result in the ability to control active pharmaceutical ingredient's blood level's in a narrow range, above the minimum effective level and below toxic level [22].

Materials

Valsartan was gift sample from Spectrum Pharma Labs Hyd. Gum Olibanum (Grade I), Gum Kondagugu (Grade I) were obtained as gift sample from Andhra Pradesh Girijan Society. Locust Bean Gum was gift sample from Balaji Drugs Limited HYD.

Methodology

Method of preparation of Valsartan Matrix Tablets

All the matrix tablets, each containing 80 mg of valsartan, were prepared by wet granulation method.
All the ingredients of the formulation were passed through sieve no# 60 and were blended in a mortar with a pestle to obtain uniform mixing.

Wet granulation

Matrix tablets of valsartan are prepared as per the formulae given in table.
The required quantities of Drug and the Micro crystalline Cellulose (diluents), PVP K-30 were sifted through sieve# 40 manually and mixed well in a mortar by following geometric dilutions to ensure the uniformity of premix blend.
The granulating fluid was added and mixed thoroughly to form dough mass.
The mass was passed through sieve #20 and Sieve #16 to obtain wet granules.
The wet granules were dried at 45 C ± 5 C for 1 hour in a hot-air oven and the dried granules were sieved through sieve #10, #12, #14, #16, #20 to break aggregates.
The glidant talc and lubricant magnesium stearate were passed through sieve #100 on to dry granules and were blended in a closed polyethylene bag.
The tablet granules were compressed into tablets on an 8 station rotary tablet punching machine equipped with flat-faced, round punches of 8-mm diameter to a hardness of 6-7 kg/cm^2. "

Table 1: Composition of Matrix Tablets

S.No	Ingredient (mg)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
1.	Valsartan	80	80	80	80	80	80	80	80	80	80	80	80
2.	Gum Olibanum Resin	4	6	8	10	-	-	-	-	-	-	-	-
3.	Purified Gum Kondagugu	-	-	-	-	30	40	50	60	-	-	-	-
4.	Locust Bean Gum	-	-	-	-	-	-	-	-	30	40	50	60
5.	Poly Vinyl Pyrrolidine K-30	20	20	20	20	20	20	20	20	20	20	20	20
6.	Micro Crystalline Cellulose (Avicel pH 101)	86	84	82	80	60	50	40	30	60	50	40	30
7.	Magenisum Stearate	5	5	5	5	5	5	5	5	5	5	5	5
8.	Talc	5	5	5	5	5	5	5	5	5	5	5	5
9.	* Ethyl alcohol	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
10.	**Total weight of the Tablet**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**	**200 mg**

*Q.S = Quantity Sufficient.

Results and Discussion

Authentification of Drug Sample and Drug-Excipient Interaction Study by FTIR Analysis

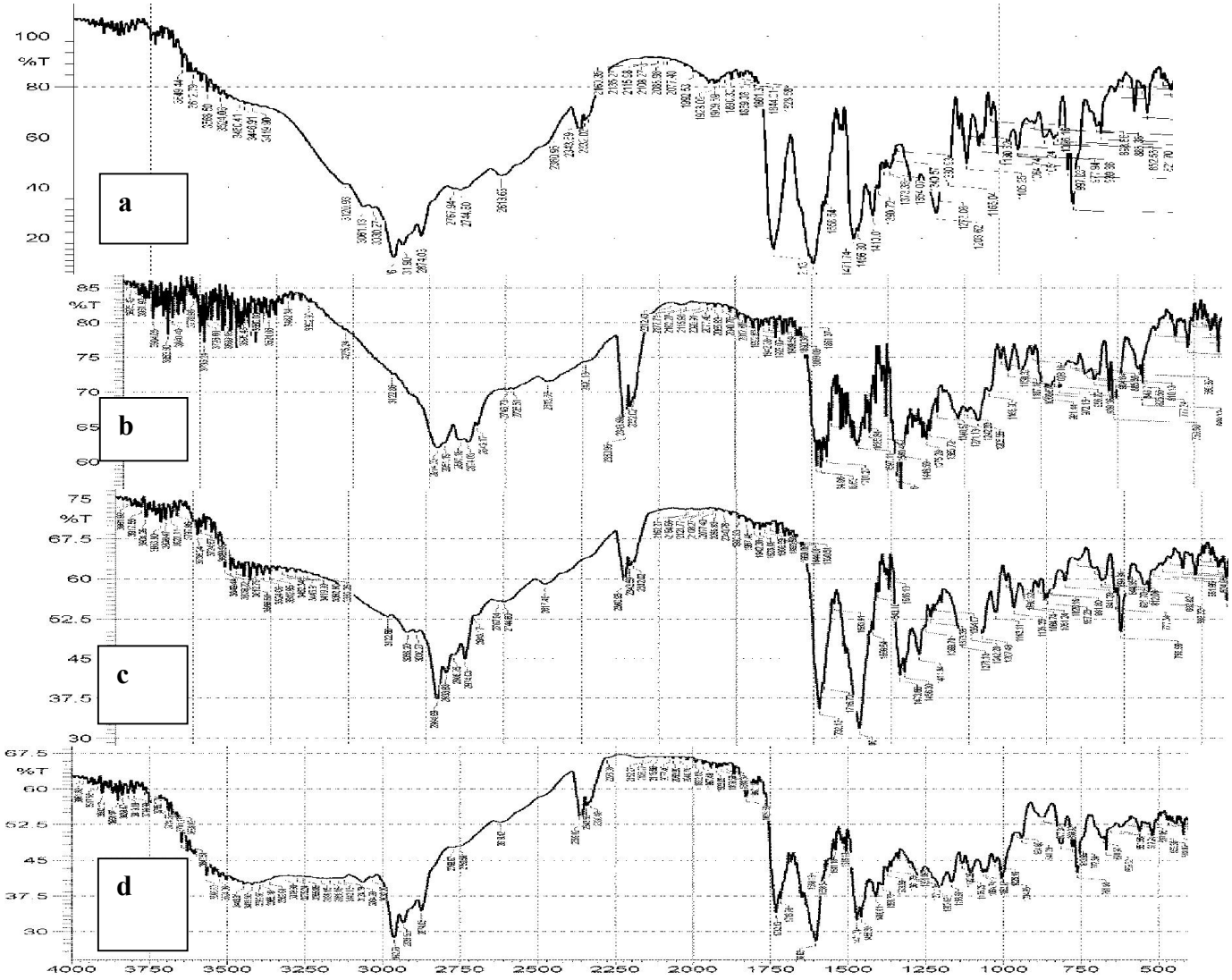

Figure 1 FTIR Spectra of --- a- Valsartan Drug Sample, b- Purified Valsartan and Gum Olibanum Resin Mixture, c- Purified Valsartan and Purified Gum Kondagogu Mixture, d- Purified Valsartan and Purified Locust Bean Gum Mixture

IR spectral studies revealed that the positions of the characteristic absorption bands for different functional groups and bonds of the pure drug were not changed considerably indicating that no interactions of the drug with polymers and others excipients used for the study.

Interpretation of FTIR Spectrum of Drug Sample and Drug-Polymer Mixtures

Table 2: Interpretation of IR Data

S.No.	Functional Group Present	Type of Vibrations	Reference Peak (cm^{-1})	Observed Peak (cm^{-1})			
				Valsartan Pure	Valsartan and Gum Olibanum Resin Mixture	Valsartan and Purified Gum Kondagogu Mixture	Valsartan and Locust Bean Gum Mixture
1.	Aliphatic	CH Stretching	2850 - 3000	2962.76	2951.19	2964.69	2962.76
		CH Bending	1378 - 1467	1456.3	1448.59	1456.3	1456.3
2.	Aromatic	CH Stretching	3000 - 3100	3030.13	2974.33	3030.27	3032.2
3.	Carboxylic acid	C=O Stretching	1050 - 1150	1105.25	1107.18	1105.25	1105.25
4.	Aromatic	C=C Stretching	1400 - 1600	1471.74	1473.66	1473.66	1471.74
6.	Aliphatic	C-N Stretching	1030 - 1230	1203.62	1205.55	1207.48	1203.62
7.	Amide	N-H Stretching	3100 - 3500	3460.41	3462.34	3462.34	3446.91
8.	Amide	C=O Stretching	1680 - 1760	1732.13	1734.06	1732.13	1732.13

Determination of Melting Point

Table 3: Melting Point of Valsartan

No. of Trails	Melting Point (^0C)		
	Observed Melting Point (^0C)	Average Melting Point (^0C)	Reference Melting Point (^0C)
Trail 1	116	116	116-118
Trail 2	118		
Trail 3	116		

Evaluation Tests

Evaluation of Micrometric Properties of Formulated Granules

Table 4: Micrometric Properties of Granules (Pre-compression Data)

Formulation Codes	Angle of Repose ( )	Bulk Density (gm/ml)	Tapped Density (gm/ml)	Carr's Index (%)	Hausner's Ratio
F1	21.21±0.03	0.44±0.04	0.52±0.06	17.18±0.04	1.22±0.91
F2	20.28±0.06	0.51±0.05	0.58±0.04	13.79±0.05	1.16±0.93
F3	22.65±0.05	0.54±0.03	0.61±0.07	15.12±0.03	1.19±0.92
F4	21.21±0.01	0.43±0.06	0.51±0.05	14.0±0.06	1.16±0.89
F5	22.68±0.09	0.40±0.05	0.45±0.06	11.11±0.07	1.12±0.93
F6	23.62±0.07	0.43±0.04	0.52±0.04	17.03±0.05	1.08±0.87
F7	20.70±0.06	0.47±0.03	0.56±0.07	12.10±0.05	1.11±0.93
F8	21.24±0.05	0.48±0.06	0.60±0.05	18.09±0.06	1.13±0.91
F9	22.11±0.04	0.44±0.07	0.52±0.07	15.07±0.07	1.15±0.89
F10	21.09±0.02	0.42±0.06	0.51±0.05	14.05±0.05	1.17±0.92
F11	22.34±0.08	0.46±0.09	0.54±.09	12.13±0.04	1.14±0.87
F12	21.68±0.02	0.44±.07	0.52±0.07	12.34±0.01	1.16±0.91

*All the values represented as mean ± Standard Deviation (SD), n=3

The Micrometric properties of granules for matrix tablets were characterized with respect to angle of repose, bulk density, tapped density, Carr's index and Hausner's ratio (table). Angle of repose ( ) was found to be within 20 - 24 and Carr's index values were less than 21 for all granules of all formulations indicating good to fair flowability and compressibility. Hausner's ratio was found to be less than 1.25 for granules of all formulations indicating good flow properties.

Post-Compression Evaluation Tests

Physical appearance: Tablets were white in color with good texture. Plane on one side and Debussed on other side.

The results of the weight variation, hardness, thickness, friability and drug content of the prepared matrix tablets of valsartan are given in table 5.

All the tablets of prepared formulations are compiled with the official requirements of weight variation as per I.P and U.S.P as their weights varied in between 200–203 mg.

The hardness of the tablets ranged from 6-7 kg/cm^2 and the friability values were found to be less than 0.8% indicating the matrix tablets were compact and hard thus they can withstand mechanical hazards.

The thicknesses of the tablets were ranged from 2.90-3.40 mm.

All the formulations satisfied the content of the drug as they contained 90-100 % of variation and good uniformity in drug content was observed

Table 5: Physical Evaluation of Matrix Tablets

Formulation Codes	‡ Weight Variation (mg)	* Thickness (mm)	* Hardness (kg/cm ^{2})	Friability (%)	Drug Content Uniformity (%)
F1	200±0.7	3.37±0.25	6.8±0.13	0.39	98.75
F2	201±0.5	3.14±0.80	6.4±0.15	0.43	98.76
F3	201±0.6	3.20±0.20	6.6±0.13	0.12	97.99
F4	200±0.8	3.08±0.66	6.8±0.14	0.54	95.80
F5	202±0.7	3.33±0.25	6.8±0.16	0.58	90.79
F6	203±0.6	3.24±0.71	6.4±0.15	0.64	97.90
F7	203±0.5	3.32±0.89	6.5±0.15	0.37	99.45
F8	200±0.6	3.38±0.73	6.9±0.14	0.17	99.67
F9	203±0.7	3.00±0.68	6.4±0.16	0.42	92.08
F10	200±0.7	2.98±0.88	6.4±0.11	0.48	95.49
F11	200±0.5	3.11±0.36	6.7±0.15	0.15	97.56
F12	201±0.6	3.06±0.46	6.6±0.13	0.27	98.11

* All the values represented as mean ± Standard Deviation (SD), n=3.

‡ All the values represented as mean ± Standard Deviation (SD), n=20

Thus all the physical attributes of the prepared matrix tablets were found to be practically within control.

Swelling Index

Since the rate of swelling is related and may affect the mechanism and kinetics of drug release, the penetration of the dissolution medium and weight gained by hydrated tablets were determined.

The swelling studies were conducted for all formulations i.e., F1 to F12. Since, the rate of swelling is related and may affect the mechanism and kinetics of the drug release, the penetration of the dissolution medium of the matrix tablets was determined. Maximum swelling was observed in formulations containing the gum kondagogu (F5-F8) as matrix formers. The swelling index of the tablets from each formulation (F1 to F12) was evaluated and the results are provided in Table 6.

Table 6: Swelling Index Study of Valsartan Matrix Tablet Formulation

S.No	Formulation Code	Initial Wt. Of Tablet (W_t) (mg)	Wt. of Tablet After Swollen Time (mg) (W_0)
1	F1	200	294.96
2	F2	201	341.86
3	F3	201	367
4	F4	200	375.22
5	F5	202	506.4
6	F6	203	570.12
7	F7	203	610.68
8	F8	200	660.78
9	F9	203	332.58
10	F10	200	349.74
11	F11	200	375
12	F12	201	389.6

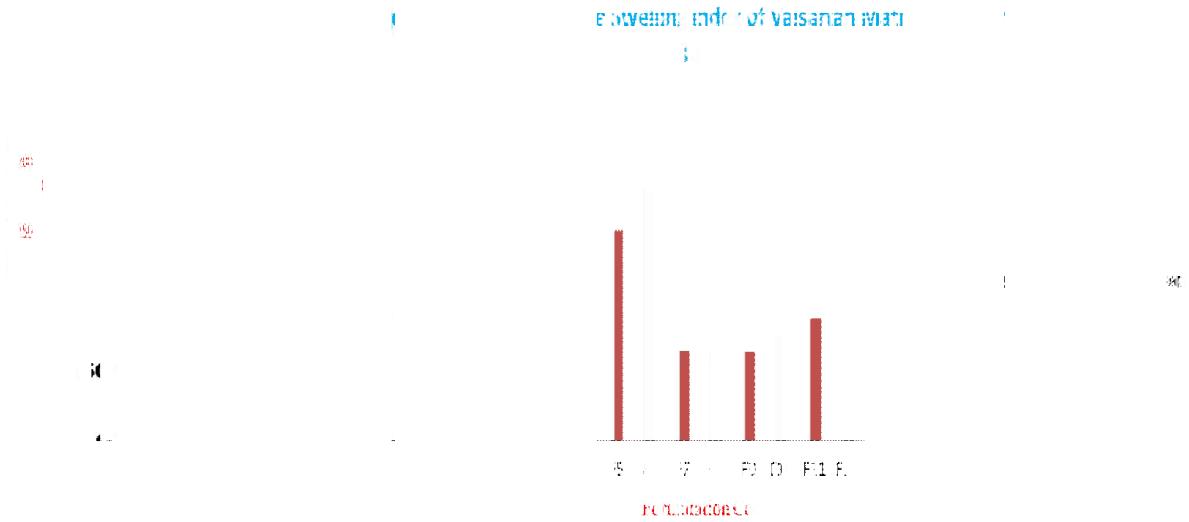

Figure.2: Bar Graph Swelling Index Study of Valsartan Matrix Tablet Formulation

In vitro Drug Release Studies

Drug Release from Gum Olibanum Resin Matrices

The results of release studies of formulations F1 to F4 are shown in Table 7 and Figure.

The release of drug depends not only on the nature of matrix but also upon the drug and polymer ratio. As the percentage of polymer increased, the drug release was decreased.

Thus, this phenomenon may be due to the fact that that as the increased density of the polymer matrix at higher concentration resulting an increased diffusional path length. There by decreasing the overall drug release from the polymer matrix.

Table 7: *In vitro* Dissolution Data of valsartan Matrix Tablets of Formulations F1 to F4

S.NO	Time (hrs)	Percentage Cumulative Drug Release (%CDR)			
		F1	F2	F3	F4
1	0	0	0	0	0
2	0.25	1.755	1.161	1.224	1.377
3	0.5	1.890	1.563	1.428	1.609
4	0.75	2.396	1.869	1.778	1.771
5	1	3.381	2.266	1.887	1.871
6	1.5	4.363	2.827	2.563	4.869
7	2	4.593	3.302	2.712	5.535
8	3	13.800	15.227	6.024	26.937
9	4	17.983	18.569	16.339	29.702
10	5	25.599	25.296	28.051	31.860
11	6	37.082	30.331	29.3621	38.332
12	7	40.627	33.873	34.161	40.411
13	8	43.354	47.549	39.644	45.183
14	9	47.310	48.836	49.845	48.081
15	10	54.220	51.343	54.639	51.948
16	11	62.527	57.868	58.666	55.898
17	12	70.267	60.594	62.263	60.048
18	14	75.215	70.434	66.419	62.862
19	16	77.780	72.758	69.3549	67.363
20	18	83.853	76.767	76.759	71.635
21	20	86.879	84.738	80.801	74.778
22	22	94.302	82.924	84.044	77.990
23	24	95.248	90.555	86.799	79.723

Drug Release from Purified Gum Kondagogu Matrices

The results of release studies of formulations F5 to F8 are shown in Table 8 and Figure 4.

Hydrophilic gum kondagogu can be used as matrix former as rate retarding polymer in formulation of matrix tablets. Formulations containing purified gum kondagogu F5 to F8 as release rate retardant extended the release up to 22-24hrs. As the polymer concentration increased the drug release was. This may be due to the mobility of the polymer chains strongly depends on the water content of the system. At high water content, polymer chain relaxation takes place with volume expansion giving rise to high swelling of the system.

Consequently, faster and higher swelling of the tablet led to increase in dimensions of the tablet, leading to increasing the diffusion pathways and thus increasing the drug release.

Table 8: *In vitro* Dissolution Data of valsartan Matrix Tablets of Formulations F5 to F8

S.NO	Time (hrs)	Percentage Cumulative Drug Release (%CDR)			
		F5	F6	F7	F8
1	0	0	0	0	0
2	0.25	1.404	2.241	3.582	2.187
3	0.5	2.725	3.072	3.880	2.928
4	0.75	3.559	3.575	4.343	3.601
5	1	6.9545	4.279	4.808	4.206
6	1.5	12.401	6.417	10.657	4.283
7	2	15.332	9.386	16.080	4.441
8	3	31.361	14.138	42.909	9.004
9	4	36.886	18.260	48.0263	9.264
10	5	47.796	22.944	51.578	14.213
11	6	52.268	34.755	52.241	16.211
12	7	54.091	42.653	54.275	24.088
13	8	54.853	45.725	60.972	26.185
14	9	56.013	51.342	63.0348	32.622
15	10	67.249	60.527	66.844	35.846
16	11	71.455	69.770	68.927	41.732
17	12	81.721	74.419	76.3664	46.228
18	14	86.103	80.739	80.8753	49.875
19	16	89.094	85.526	82.419	55.125
20	18		88.105	83.412	67.981
21	20		90.103	85.929	79.593
22	22			87.883	83.239
23	24			90.583	96.695

Drug Release from Locust Bean Gum Matrices

The results of release studies of formulations F9 to F12 are shown in Table 9 and Figure 5.

Table 9: *In vitro* Dissolution Data of valsartan Matrix Tablets of Formulations F9 to F12

S.NO	Time (hrs)	Percentage Cumulative Drug Release (%CDR)			
		F9	F10	F11	F12
1	0	0	0	0	0
2	0.25	1.473	1.755	1.42	1.179
3	0.5	3.590	1.890	1.762	1.248
4	0.75	4.537	2.702	2.357	2.218
5	1	5.633	2.789	2.883	3.247
6	1.5	8.337	3.281	3.241	3.742
7	2	12.585	3.992	4.348	4.915
8	3	30.342	12.245	9.730	18.127
9	4	35.445	19.428	19.300	22.826
10	5	43.186	25.588	27.825	26.984
11	6	48.295	29.586	33.273	30.787
12	7	50.742	33.732	40.390	40.298
13	8	57.232	37.675	42.649	46.738
14	9	59.276	43.304	45.2706	52.115
15	10	62.445	48.289	49.54	56.350
16	11	67.854	56.161	52.974	63.407
17	12	69.755	57.687	58.367	69.034
18	14	75.696	61.946	68.586	78.678
19	16	79.850	65.840	75.269	80.561
20	18	80.705	68.188	81.339	
21	20	84.515	76.109		
22	22	86.876	81.436		
23	24	90.887	88.391		

The results of In vitro dissolution study of matrix tablets were prepared from locust bean gum with varying gum concentration in formulation F9 to F12 shows drug release was not satisfactory up to 24hrs.

It is reported that as the concentration of gum increase the drug release was decreased. This phenomenon may citied as in the literature that by increasing the polymer concentration, a viscous gel layer is formed, resisting to the erosion and the diffusion of the drug is mainly controlled primarily by the gel viscosity.

The viscosity of the gum solution strongly increases with increase in the concentration of gum. The behavior is attributable to the intermolecular interaction (or) entanglement, increasing the effective macromolecule dimensions and molecular weight. As a result of rheology of hydrated product, the swollen particles coalesce.

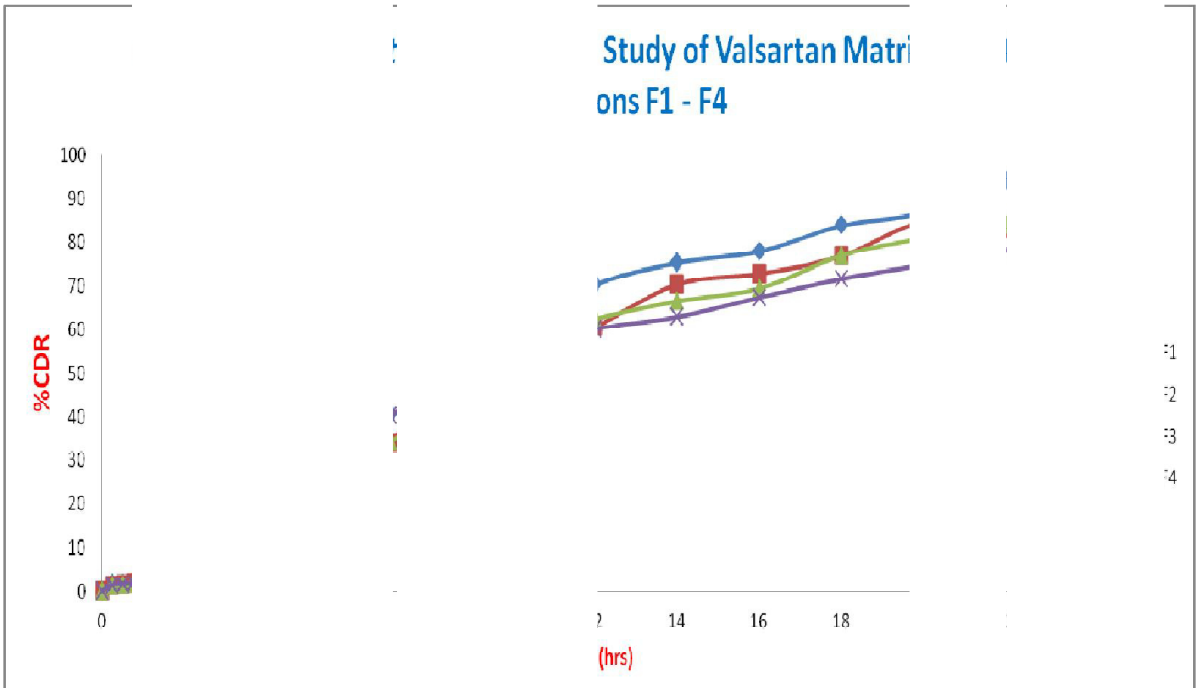

Figure 3: comparison of *in vitro* drug release profile of F1-F4 formulations.

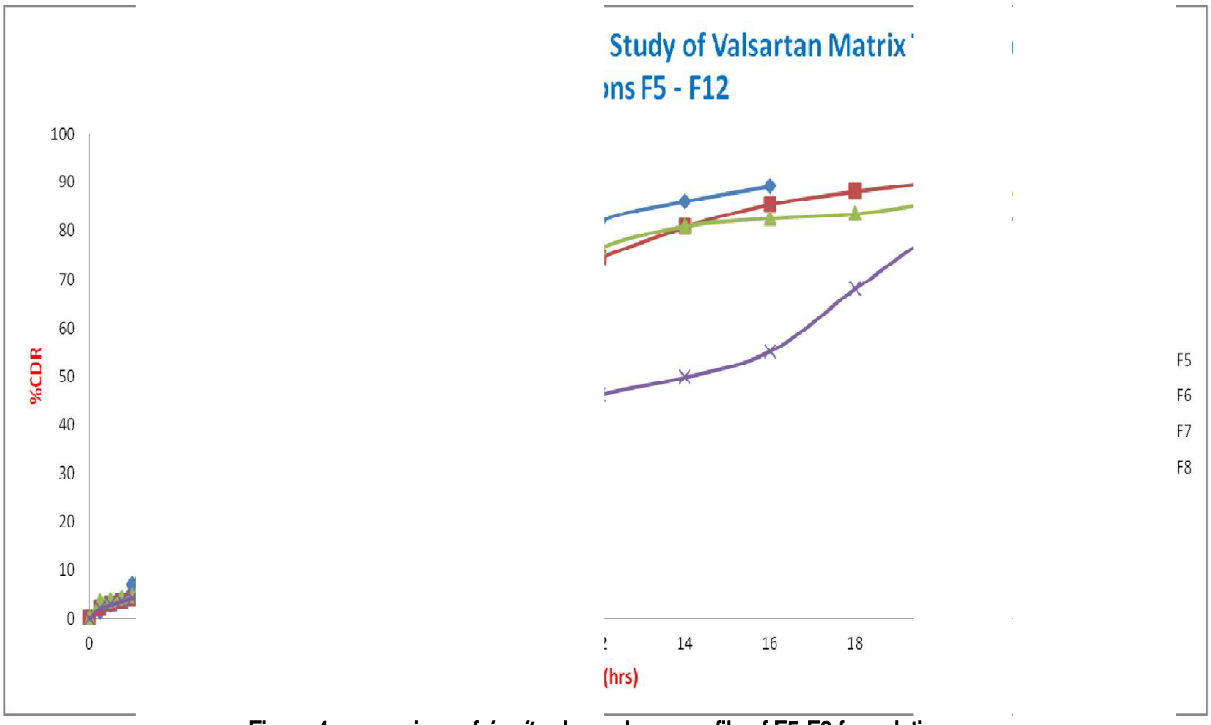

Figure 4: comparison of *in vitro* drug release profile of F5-F8 formulations

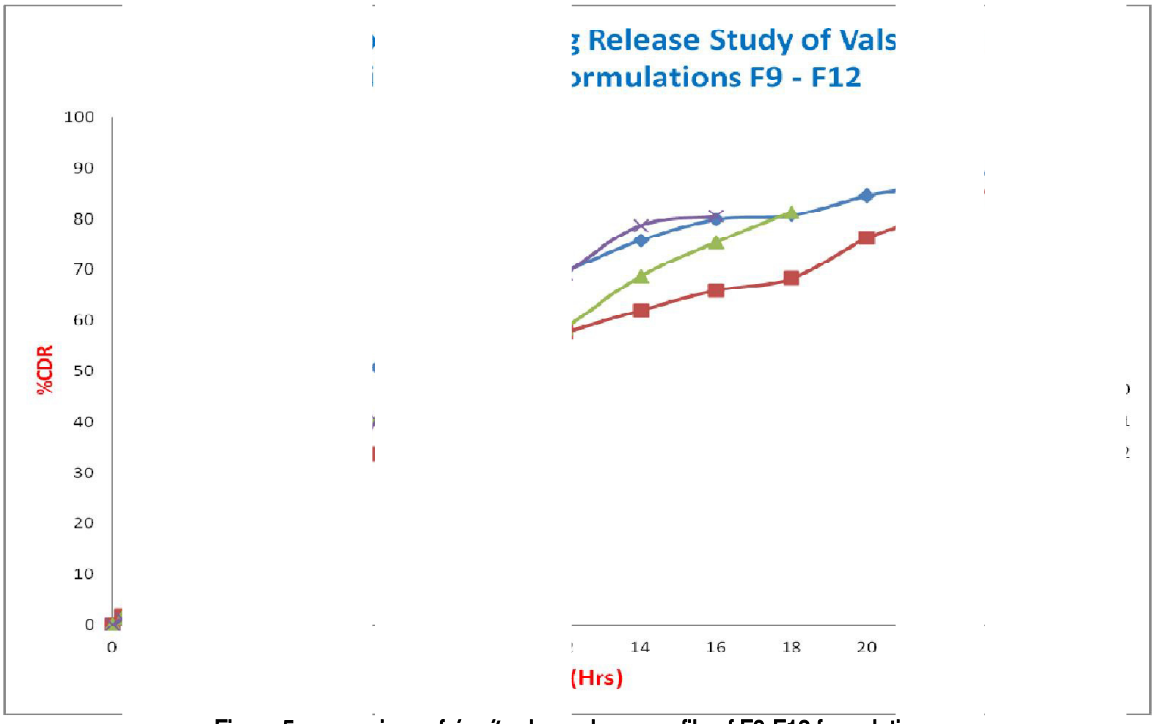

Figure 5: comparison of *in vitro* drug release profile of F9-F12 formulations

Table 10: Comparison of Kinetic Data of Optimized Formulation F8

Formulation Code	Correlation Coefficient (r^2)				Diffusional Exponent (n)	Inference
	Zero Order	First Order	Higuchi Equation	Korsmeyer - Peppas	Korsmeyer - Peppas	
F8	0.9877	0.7948	0.894	0.9514	0.9094	Zero order and Super Case II Transport

The release rate kinetics data for the F8 is shown in table 10 . As shown in figures 6-9, drug release was best explained by Zero-order equation, as the plots showed higher linearity (r2=0.9877), followed by Korsmeyer - Peppas (r2=0.9514) and Higuchi equation (r2=0.894) and first order (r2=0.7948). As the drug release was best fitted in the Zero order kinetics, indicating that the rate of drug release is concentration independent.

Mechanism of Drug Release

As shown in fig.9, the corresponding plot (Log Cumulative Drug Release Vs Log time) for Korsmeyer – Peppas equation indicated a good linearity (r2=0.9514). The diffusional exponent "n" was 0.9094, which appears to indicating the release of drug polymer matrix formulations was found to be super case-II transport, i.e., drug release by more than one mechanism. Super case II transport generally refers to erosion of polymeric chain and anomalous transport.

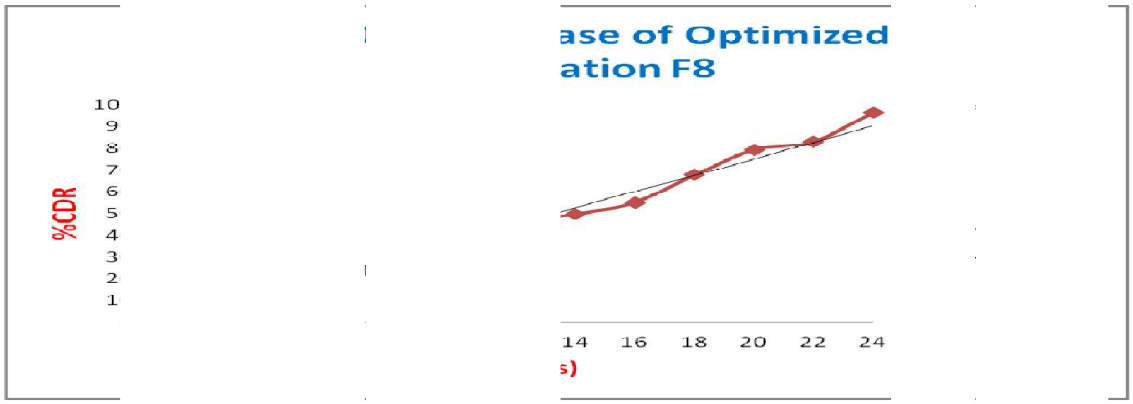

Figure.6: Zero order Graph for Kinetic Data of Optimized Formulation F8

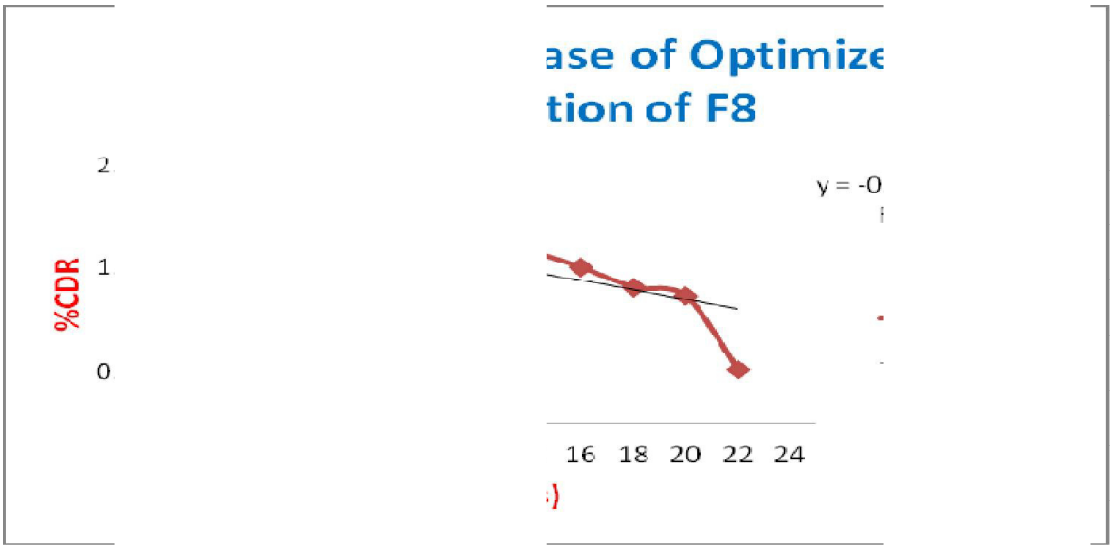

Figure.7: First order Graph for Kinetic Data of Optimized Formulation F8

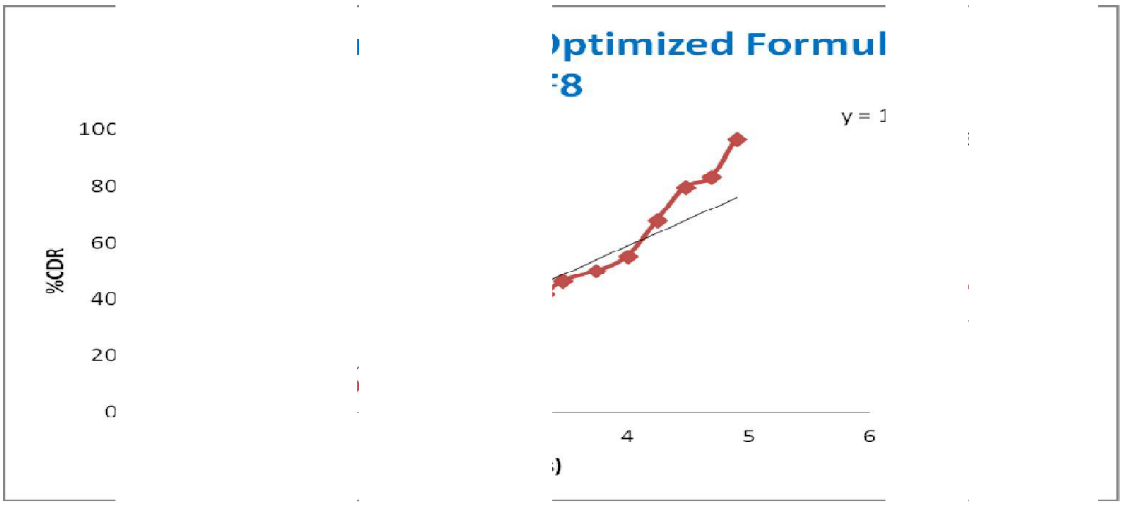

Figure.8: Higuchi Equation Kinetic Data of Optimized Formulation F8

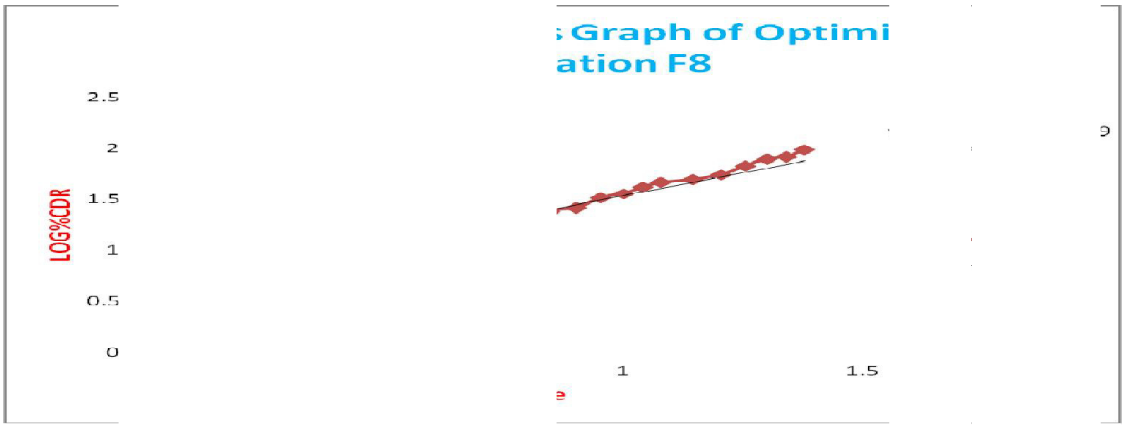

Figure.9: Korsemyer-Peppas Graph for Kinetic Data of Optimized Formulation F8

Accelerated Stability Studies

Stability studies of the optimized formulation did not reveal any degradation of the drug and dosage form.

Table 11: Accelerated Stability Study of Optimized Formulation F8

Parameter	Time (Months)			
	0 Month	1st Month	2nd Month	3rd Month
*Hardness (kg/cm^2)	6.9±0.14	6.9±0.12	6.9±0.10	6.9±0.09
Friability (%)	0.17	0.17	0.17	0.17
*Thickness(mm)	3.38±0.73	3.38±0.65	3.38±0.55	3.38±0.55
* Drug content (%)	99.67±0.040	99.65±0.039	99.62±0.019	99.62±0.013
In vitro drug release (%)	96.69	96.69	96.69	96.69

*All the values represented as mean ± Standard Deviation (SD), n=3.

The stability of this optimized formulation was known by performing stability studies for three months at accelerated conditions of 40^{0}C ± 75 % RH on optimized formulation. The formulation was found to be stable, with no change in the weight variation, thickness, and friability, hardness, drug content and *In vitro* drug release pattern. The results are tabulated in table 11.

Table 12: Phytochemical Evaluation of Gum Olibanum Resin

S.No.	Test	Inference
1.	Solubility Test in Water	Insoluble in Water
2.	Solubility Test in Ether	Soluble in Ether
3.	Turbidity Test	Turbidity was observed when added to water
4.	Hydrochloric Acid Test	Pink color was developed upon heating
5.	Ferric Chloride Test	Brown to Blue color was observed
6.	Cupric Acetate Test	Green color was observed

Table 13: Phytochemical Evaluation of Purified Gum Kondagogu

S.No.	Test	Inference
1.	Water Solubility Test	-
2.	Molisch Test	++
3.	Fehlings TestTest	++
4.	Solubility Test in Ethanol	-
5.	Iodine Test	-

++ Present, - Negative

Accelerated Stability Studies

Stability studies of the optimized formulation did not reveal any degradation of the drug and dosage form.
the values represented as mean ± Standard Deviation (SD), n=3.
The stability of this optimized formulation was known by performing stability studies for three months at accelerated conditions of 400C + 75 % RH on optimized formulation. The formulation was found to be stable, with no change in the weight variation, thickness, and friability, hardness, drug content and In vitro drug release pattern. The results are tabulated in table 11.

Conclusion

Finally the prolong release of valsartan from prepared matrix tablets was achieved by designing the formulations in such a way by varying proportions of polymer concentrations. Among gum olibanum resin, purified gum kondagogu, locust bean gum the swelling index was higher for the tablets prepared by employing purified gum kondagogu. And it showed extent of swelling 3-4% of its original volume.
Among all the batches of prepared matrix tablets, formulation prepared by employing the gum kondagugu in the concentration of 30%, F8 showed better release of valsartan from matrix tablets of 96.88 % and all the Pre-compression and Post-compression parameters are also within the limit as per pharmacopoeial standards.Further the analysis of release mechanism was carried out by fitting the drug release data to various kinetic equations like Zero order, First order, Higuchi's and krosmeyer - peppas equations and from the values so obtained, the best fit model were arrived .
Stability studies of the selected formulation was carried out to determine the effect of formulation additives on the stability of the drug and also to determine the physical stability of the formulation. The stability studies were carried out at 40 C/75% RH for 90days. There was no significant change in the physical property and weight variation, hardness, thickness, friability, swelling studies, surface pH, In vitro drug release studies, drug content during the study period.

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