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Formulation and Evaluation of Valsrtan Orodispersible Tablets Using Directly Compressible Co-Processed Excipient of Jujube *Ziziphus jujuba* Gum

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ABSTRACT

The aim of the present research work is to develop fast dissolving tablets of Valsartan applying novel directly compressible (DC) co-processed excipient which improves the functionality and masking the undesirable properties of the drug without any chemical modification. For the development of co-process excipient, synthetic superdisintegrants like crospovidone, sodium starch Glycolate (SSG) and Croscarmellose sodium(CCS) were processed with natural disintegrates Jujube *Ziziphus jujuba* gum in varying ratios 1:1 to 1:4. Co-processed excipient prepared from polymers ratio of 1:1 and 1:2 have shown good Physico-chemical properties, pre compression parameters like angle of repose, bulk density, true density, compressibility index. The post compression parameters have shown acceptable and within the pharmacopeia limit. *In-vitro* drug release for all the formulationsF1 to F12 were found in between 95 to 97% and were satisfactory. The optimized formulation F2, Jujuba gum 4% with 2% of SSG, the drug release was found to be is 97% within 2min. Developed optimized formulations were kept for stability study for one month as per ICH guidelines and found to be stable. The study indicates that use of co-processed excipient has an added advantage over individual polymers and can be used in Orodispersible tablet formulations irrespective of drug type.

1. INTRODUCTION

Hypertension is a chronic medical condition in which the blood pressure in the arteries is elevated. Hypertension puts strain on the heart, leading to hypertensive heart disease and coronary artery disease if not treated. Beta-blocker is one of a drug used to reduce hypertension. It works by making our heart beat more slowly and with less force, thereby reducing blood pressure. Tablet is still the most popular dosage form among all existing forms because of ease of self administration, compact in nature, easy to manufacture and due to accurate in dosing. One main limitation of solid dosage form is difficulty in swallowing and chewing particularly in geriatric and pediatric patients [1]. The concept of orodispersible drug delivery system has emerged with an objective to improve patient's compliance. These dosage forms rapidly disintegrate which cause to release the drug as soon as they come in contact with saliva. So the need for water during administration is not necessary that makes them highly attractive for pediatric and geriatric patients and in emergency conditions like stroke, Parkinson's disease and motion sickness. The European pharmacopoeia adopted the term "Orodispersible tablet" as a tablet that to be placed in the mouth where it disperses rapidly before swallowing and it should disintegrate in less than three minutes [2].Now a days the pharmaceutical industries and formulators are widely oriented for the use of natural excipient viz. emulsifier, stabilizer, gelling agent, granulating agent, suspending agent, binder, film former, disintegrates, etc. Natural gums and mucilage's are preferred over semi-synthetic and synthetic excipient in the field of drug delivery because they are cheap, easily available, biodegradable, biocompatible and nonirritant in nature.

In rapid fast dissolving tablets (FDTs) disintegration, the active substance comes into contact with the taste buds and the need for a pleasant taste for patient palatability. Hence, the taste-masking of bitter active substances is a critical hurdle for the successful approach of FDT formulations. To increased patient compliance with dissolving or disintegrating tablets which include sweeteners and flavors and these additives were not a sufficient means for complete taste-masking. Recent advances in technology have presented viable dosage alternatives to taste-mask bitter drugs. Several approaches have been reported which involve complication, freeze-drying, microencapsulation, fluidized-bed coating and supercritical fluids for taste-masking purposes [3].

Co-processing is based on the novel concept of two or more excipient interacting at the sub particle level. The objective is to provide a synergistic improvements as well as masking the

undesirable properties of individual excipient. To produce tailor-made "designer excipient" to address specific functionality requirements co processing ensures numerous possibilities [4].

The development of a co-processed excipient involves the following steps. It initiates with the study of the material characteristics and functionality requirements by identifying the group of excipient to be co-processed. Secondly selection of the proportions or concentrations of various excipient followed by assessing the particle size required for co-processing and finally selection of a suitable process. The co-processed excipient have the multifold advantages which offered a single excipient with multiple functionalities such as removal of undesirable properties, overcome the limitation of existing excipient, improvement of organoleptic properties, production of synergism in functionality of individual components, reduction of industrial regulatory concern because of absence of chemical change during co-processing, improvement in physico-chemical properties, etc.

Ziziphus is a small genus of quick growing tree distributed in India. The Zizipus tree fruits pulp gum which is initially white (or)in cream colour but changes to reddish brown or brownish black on exposure to sunlight. It is sparingly soluble in water but swells in contact with water giving a highly viscous solution. It is a Polyuronide consisting of Arabinose, Galactose and Glucoronic acid in the proportion of 10:7:2. The reports say about the application of **Jujube *Ziziphus*** *jujuba*, ***Ziziphus*** *mauritiana*, and *Ziziphus spinosa* gum as gelling, suspending agent, film former, binder and release retardant in tablets. The gum has also got a high lethal dose (LD_{50}) in mice indicating it is safety to use. Considering these utilities this research work carried out for Orodispersible Valsartan formulation with the co-processed excipient blended with natural polymer of Ziziphus gum [5].

2. MATERIALS AND METHODS

2.1. Materials

Valsartan was obtained as a gift sample from Biocon, Bangalore. Lactose was purchased from Suvidhinath Laboratories, Baroda. Crospovidone, croscarmellose sodium (CCS), sodium starch Glycolate (SSG), aspartame were purchased from Aman scientific products, Vijayawada. Sodium bicarbonate, microcrystalline cellulose (MCC) were purchased from Qualigens Fine Chemicals, Mumbai. Ethyl cellulose and mannitol were purchased from Finer Chemicals Ltd, Ahmadabad, India. Jujube *Ziziphus jujuba* gum was collected and processed at

Vikas pharmaceutical laboratory, Vissannapeta, India. All other ingredients used were of analytical grade.

2.2. Collection and purification of the Jujube *Ziziphus jujuba* gum

Jujube *Ziziphus jujuba* is a small genus of quick growing tree distributed in India. The f of the ripe fruits are containing pulp gum which is initially white or cream in colour but changes to reddish brown or brownish on exposure to sunlight. It is sparingly soluble in water but swells in contact with water giving a highly viscous solution. The fruits contain 68.0 % moisture. Their pulp contains, 3.92 % acidity, 8.68 % total sugars, 6.73 % reducing sugars, 1.85 % non-reducing sugars, 1.72 % pectin and 1.32 % tannins. Vitamin C contents of this fruits 2.56 mg per 100 g of pulp. The total mineral content of the fruit pulp, as represented by its ash, is 1.38 %. The protein content of the pulp is 2.56 %.Some of the mineral elements in the fruit pulp, 0.069 % phosphorus, 0.583% potassium, 0.083 % calcium, 0.065 % magnesium and 0.006 % iron.

METHODS

Isolation of the Gum

Mucilage's are viscid, somewhat tenacious and adhesive liquid prepared with water as solvent. The mucilage was isolated from freshly dried and coarsely powdered seeds of Jujube *Ziziphus jujuba.* To 20g of seed powder of Jujube *Ziziphus jujuba*, 200 ml of cold distilled water was added and slurry was prepared. The slurry was poured into 800ml of boiling distilled water. The solution was boiled for 20 min under stirring condition in a water bath. The resulting thin clear solution was kept overnight so that most of the proteins and fibers settled out. The material was squeezed in a muslin bag to remove the marc from the filtrate. The filtrate was poured into twice the volume of absolute ethanol with continuous stirring to precipitate the mucilage. The mucilage was separated and dried in an oven at temperature <50 ^{o}C. The dried mucilage was powdered in a ball mill and passed through #120 sieve using sieve shaker and stored in desiccators until further use

2.3. Preparation of co-processed super disintegrates with natural polymer of Jujube *Ziziphus jujuba* gum

The co-processed excipients were prepared by granulation method using different concentrations of Ziziphus mucilage like 2-8% respectively. The Zizipus mucilage (2% w/v) was formed by dispersing 200 mg of Ziziphus in 10 ml of lukewarm water. Similarly4, 6 and 8% w/v of mucilage were also prepared by following same procedure. The mucilage of 2to 8 % ware added to the various superdisintegrants (2%) like sodium starch Glycolate, croscarmellose sodium, crospovidone with microcrystalline cellulose of 20 % w/w , aspartame sodium (1%w/w) and mannitol q.s. until a damp mass were obtained. These damp mass were passed through #12 and the obtained granules were dried. The dried granules were passed through a series of mesh like #10, #16, #24 and the granules retained on 16# were collected and stored [6].

2.4. Formulation of orodispersible tablets by direct compression method

Jujube *Ziziphus jujuba* Orodispersible tablets were prepared by direct compression technique. The drug 20mg,co-processed excipients of various ratio, talc (1%), magnesium sterate (1%) were mixed homogeneously for 10 min.To that dry blendpeppermint oilwas sprinkled for organoleptic enhancement. The resultant mixture was compressed into tablets in 8mm die cavities using Riddhi mini tablet press punching machine. Twelve formulations were prepared by varying the amount of the ingredients as shown in table 1.

Table 1.Composition of Zizipus jujube orodispersible tablets (F1-F12).

Batch code	Drug: polymer ratio	Polymer ratio to total blend
F1	1:2.5	2:2:20:1 (Jujube Zizipus Gum: SSG: MCC: Aspartame)
F2	1:2.7	4:2:20:1 (Jujube Zizipus Gum: SSG : MCC : Aspartame)
F3	1:2.9	6:2:20:1 (Jujube Zizipus Gum SSG : MCC : Aspartame)
F4	1:3.1	8:2:20:1 (Jujube Zizipus Gum SSG : MCC : Aspartame)
F5	1:2.5	2:2:20:1 (Jujube Zizipus Gum: CCS : MCC : Aspartame)
F6	1:2.7	4:2:20:1 (Jujube Zizipus Gum: CCS : MCC : Aspartame)
F7	1:2.9	6:2:20:1 (Jujube Zizipus Gum: CCS : MCC : Aspartame)
F8	1:3.1	8:2:20:1 (Jujube Zizipus Gum: CCS: MCC : Aspartame)
F9	1:2.5	2:2:20:1 (Jujube Zizipus Gum: Crospovidone: MCC: Aspartame)
F10	1:2.7	4:2:20:1 (Jujube Zizipus Gum: Crospovidone : MCC: Aspartame)
F11	1:2.9	6:2:20:1 (Jujube Zizipus Gum: Crospovidone: MCC :Aspartame)
F12	1:3.1	8:2:20:1 (Jujube Zizipus Gum: Crospovidone : MCC :Aspartame)

2.5. Evaluation tests for Orodispersible tablets

Evaluation was performed to assess to the physicochemical properties and release characteristics of the developed formulations. The orodispersible tablets of Valsartan were evaluated for the following studies [7].The following pre-formulation studies were performed with Valsartan dry blend with all formulation components.

2.5.1. Angle of repose

The frictional forces in a loose powder can be measured by the angle of repose 'θ'. It is defined as the maximum angle possible between the surface of a pile of powder and the horizontal plane. It is determined by the fixed funnel and free standing cone method. An accurately weighed 5g powders of Valsartan were carefully poured into the funnel with its tips about 2cm height(h) until the apex of the conical heap formed to be just reached the tip of the funnel .The mean diameter (r) and height were calculated and the angle of repose (^{0}) was calculated by using formula:

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

2.5.2. Bulk density and tapped density

A quantity of 5 gm of Valsartan previously lightly shaken to break any agglomerates formed was introduced into a 10 ml measuring cylinder of the tapped density apparatus maker of Campbell electronics, Mumbai. The apparent volume (V_0) was observed and the cylinder was allowed to hit a height of 2.5cm at 2 sec intervals until there were no further changes in volume. Both bulk density (V_0) and tapped bulk density (V_f) were determined.

2.5.3. Carr's index (I)

It indicates the ease with which a material can be induced to flow. It is expressed in percentage and is given by

$$I = 100 \times \frac{V_0 - V_f}{V_0}$$

Where 'V_f' is the tapped density and 'V_0' is the bulk density of the powder.

2.5.4. Hauser's ratio

This indicates the flow properties of the powder and measured by the ratio of tapped density to the bulk density.

2.6. Physical evaluation tests

The tablets were tested for post compression quality control tests like hardness, friability, weight variation and disintegration test.

2.6.1. Hardness

Tablets require a certain amount of strength or hardness and resistance to friability, to withstand mechanical shock of handling in manufacture, packaging and also in shipping. The hardness was tested for 5 tablets from each formulation batch using Monsanto hardness tester and the average of the three is reported. It is expressed in kg/cm^2.

2.6.2. Friability testing

As specified in the United State Pharmacopoeia (USP) weight variation test was run by taking 10 tablets. The weight (W1) of those tablets was determined before re dusted prior to weighing.

The tablets were then placed in a test drum of friability tester 'FR1000' of Copley Scientific, Mumbai, India and allowed to rotate for 100 times. The tablets were reweighed (W2) having first removed accumulated dust to them. The result was calculated in terms of % weight loss by utilizing the following formula.

$$\text{Friability (\%)} = \frac{W1 - W2}{W1} \text{x } 100$$

The maximum weight loss not more than 1% is normally acceptable.

2.6.3. Weight variation test

20 tablets from each formulation were randomly picked up and weighed individually and the average weight was calculated. The individual weights were then compared with the average weight.

$$\%\text{Deviation} = \frac{\text{Average weight of tablet-individual tablet weight}}{\text{Average weight of tablet}} \times 100$$

The maximum weight variation not more than 7.5% is normally acceptable for the tablets weigh between 80mg to250mg.

2.6.4. Uniformity of drug content

Randomly selected 5 tablets were powdered from each formulation. The quantity equivalent to single dose of the drug was dissolved in 50 ml buffer solution of pH 1.0N HCL for 5 hours with occasional shaking. After filtration to remove insoluble residue if any, 1 ml of the filtrate was diluted to 10 ml with the buffer. The absorbance was measured at the required λmax using a UV visible spectrophotometer. The experiments were carried out in triplicate for all formulations and average values were recorded [8]. The drug content was calculated using the following equation.

$$\%\text{ Drug content=Conc. (µg/ml) ×Dilution factor} \times {}^{100}/_{50}$$

2.7. Disintegration test

To test for disintegration time, one tablet was placed in each tube, and the basket rack was positioned in a 1L beaker of medium at 37 ± 2^0C. The standard motor driven device was used to

move the basket assembly containing the tablets up and down through a distance of 5 to 6 cm at a frequency of 28 to 32 cycles per minute. Perforated plastic discs were placed on top of the tablets.

2.8. In-vitro drug release studies

In-vitro dissolution studies were performed in a USP XXIII dissolution test apparatus, type II (paddle method) (Disso 2000, Lab India, India) at 37±0.5^{0}C and with a paddles rotation speed of 50 rpm [9]. The compression coating floating tablets were placed into 900ml of phosphate buffer solution (pH 1.0N HCL) as the dissolution medium. The tablets were placed in 316 stainless steel sinkers which kept them in sink condition during the dissolution study. Dissolution studies were carried out in triplicate. 10ml aliquots of samples were collected at 5 minute interval up to 30 min. They were filtered and estimated for Valsartan release using UV-visible spectrophotometer at 247nm. At each time of withdrawal, 10ml of fresh medium was replaced into the dissolution flask. The concentrations were calculated using the standard calibration curve prepared using 1.0N HCL as solvent.

2.9. Mechanism of drug release

To study the release kinetics, the data obtained from *in vitro* drug release studies were plotted in various kinetic models as follows[10].

1. Zero order: Cumulative % of drug released versus time;

2. First order: Log cumulative % of drug remaining versus time;

3. Higuchi: Cumulative % of drug released versus square root of time; and

4. Korsmeyer–Pappas: Log cumulative % of drug released versus log time.

The linearity of the plots was obtained from the values of regression coefficient (R^2). The model with the highest linearity (R^2 value approaching unity) was chosen as the best fit kinetic model.

2.10. Accelerated stability studies

Short-term accelerated stability testing was carried out according to ICH guidelines considering 40±2 °C/75±5%relative humidity (RH) in a stability chamber for a period of one month. The compression coating floating tablets of optimized formulation were subjected to stability

studies at both initial evaluation and at the end of first month of the tablets exposed to stability chamber were again analyzed for their physical appearance, assay (%) and *in vitro* drug release profile at 5^{th}, 10^{th} and 20^{th} minutes.

3. RESULTS AND DISCUSSION

3.1 Evaluation of pre compression parameters

Pre-compressed powder blend were studied by performing tests angle of repose, bulk density, tapped density, compressibility index and Hausner ratio and cited in table 2.

3.1.1. Angle of repose

The angle of repose found to be within the limit of 20.22±0.24 to27.12±0.22 which indicated excellent flow.

3.1.2. Bulk density

The bulk density of all formulation was found in the range of 0.262±0.02 to 0.288±0.03g/cc. It is within the acceptable limits.

3.1.3. Tapped density

The tapped density of all formulation was found in the range of 0.262±0.02 to 0.288±0.03g/cc. It is within the acceptable limits.

3.1.4. Compressibility index

Carr's index was found to vary from 15.73 to 19.27, which indicated good flow ability and fair compressibility.

3.1.5. Hausner's ratio

The result of the Haussler's ratio of all formulations was found between1.19 to 1.24 which indicates good flow behavior of formulation blend.

Table 2.Evaluation of Pre-compression parameters.

Batch code	Angle of repose (X±SD)	Bulk density(g/cc) (X±SD)	Tapped density(g/cc) (X±SD)	Hausner ratio	Compressibility index (Carr's index)
F1	20.34±0.04	0.224±0.03	0.274±0.04	1.22	18.25
F2	21.32±0.12	0.226±0.02	0.272±0.03	1.20	16.91
F3	20.42±0.08	0.225±0.03	0.267±0.01	1.19	15.73
F4	20.52±0.61	0.239±0.02	0.288±0.03	1.21	17.01
F5	20.47±0.22	0.222±0.03	0.275±0.02	1.24	19.27
F6	24.28±0.34	0.235±0.02	0.279±0.01	1.19	15.77
F7	23.56±0.41	0.234±0.01	0.282±0.03	1.21	17.02
F8	25.28±0.26	0.237±0.02	0.286±0.02	1.21	17.13
F9	20.22±0.24	0.219±0.05	0.262±0.02	1.20	16.41
F10	24.8±0.14	0.232±0.05	0.277±0.01	1.19	16.25
F11	23.16±0.62	0.234±0.04	0.279±0.03	1.19	16.13
F12	27.12±0.22	0.237±0.02	0.286±0.02	1.21	17.13

Data are represented as mean(X) ±standard deviation (SD), n=3

3.2.Physical evaluation of oral dispersible tablets

The tablets were tested for post compression quality control tests [11] like hardness, friability, and weight variation and disintegration test. The results were shown in table3.

3.2.1. Hardness

The harness of the tablets of all formulations was within the range of 3± 0.03 to 4.1±1.17 kg/cm^2. The result indicates that all the formulated tablets pass the test.

3.2.2. Friability

The result revealed good adhesion of tablets ingredients. So, all the formulated tablets pass the test.

3.2.3. Content uniformity

As per the IP the content uniformity should be in the range 85-100%. The results showed that the percentage of Valsartan was ranging from 87-98% in all the formulations. The result revealed that the drug is uniformly dispersed in the formulations and confirms the homogeneous mixing of the drug and polymer [13].

3.2.4. Weight variation test

All the formulated tablets were showing within 5% deviation. Result indicated that all the formulated tablets pass the test.

3.2.5. Disintegration test

The disintegration time of formulated batches has shown in the range of 36 to 83 seconds. Among all the formulation batches, formulation F2 has shown least disintegration time of 36 sec.

Table 3: Post compression studies of Valsartan tablets formulated with Co-processed Jujube Zizipus gum.

Batch code	Weight variation (mg) (X±SD)	Hardness (kg/cm^2) (X±SD)	Friability (%) (X±SD)	Drug content (%) (X±SD)	Disintegration (seconds) (X±SD)
F1	196±0.2	3± 0.03	0.34±0.02	89.92± 0.02	47±3
F2	198±0.5	3.5± 0.04	0.33±0.03	92.03± 0.02	36±4
F3	208±0.5	4± 0.03	0.33±0.05	95.56± 0.01	44±12
F4	204±0.5	3± 0.05	0.44±0.11	87.95± 0.01	63±9
F5	205±0.2	3± 0.04	0.42±0.2	93.29± 0.02	55±8
F6	189±0.6	4± 0.03	0.37±0.12	95.0± 0.02	43±7
F7	187±0.4	4.1±1.17	0.43±0.16	98.25± 0.01	54±15
F8	199±0.6	4±1.25	0.42±0.08	97.81± 0.03	83±8
F9	209±0.4	3.8±1.1	0.35±0.1	93.75± 0.02	56±4
F10	207±0.2	3± 0.04	0.42±0.6	90.7± 0.01	43±6
F11	212±0.5	4± 0.02	0.33±0.2	98.73± 0.03	54±15
F12	205±0.4	3.1±1.7	0.41±0.15	95.21± 0.02	68±12

Data are represented as mean(X) ±standard deviation (SD), n=3

3.3 Drug release study of Valsartan tablets formulated with co-processed Jujube Ziziphus gum

For conformation and optimization of orodispersible tablets of F1 to F12 were evaluated for release of Valsartan in dissolution medium of phosphate buffer solution (pH 1.0N HCL). Immediate release profile was studied at 5, 10, 15, 20, 25 and 30 minutes respectively. The graphical release pattern is displayed in fig. 2. The cumulative percentage of Valsartan released from orodispersible tablets was repeated three times (n=3).From the above studies it was concluded that the release rate of F2 has shown a steady immediate release with in 15 min[14].

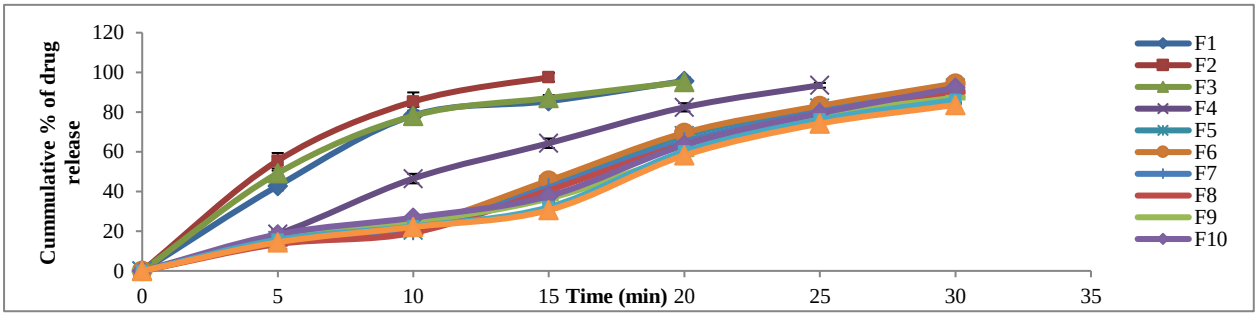

Fig.1.*In vitro* dissolution study of all formulations (F1-F12)

(Data are represented as mean ±SD, n=3)

3.4 Drug-excipients interaction studies

Drug-excipients interaction studies were performed using FTIR spectrophotometer [15]. The FTIR spectra for the formulation and pure drug are shown in fig. 3-5. Characteristics peaks obtained for the pure drug correlated well with that of the formulation peaks. These indicated that the drug was compatible with the formulation component thereware nochemical interactions betweentheValsartan and co-processed Jujube *Ziziphus jujuba* gum [16].

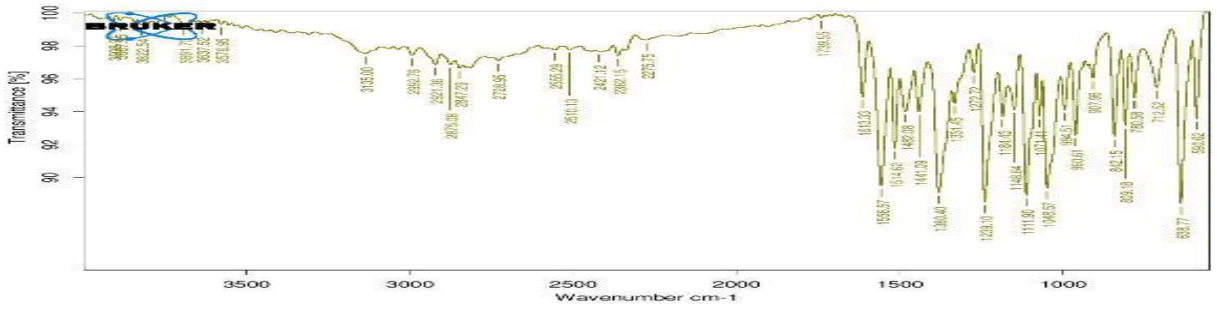

Fig.2.IR Spectrum forValsartan.

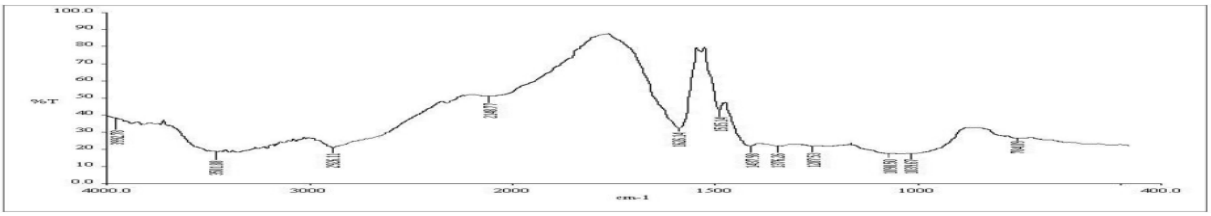

Fig.3. IR Spectrum for Jujube *Ziziphus jujuba* Gum.

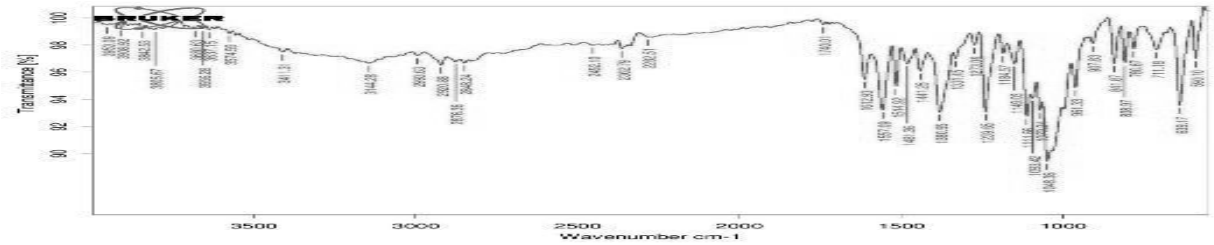

Fig. 4.IR Spectrum of optimized formula (F2) of Valsartan with co-processed Jujube Ziziphus gum.

3.5 Accelerated stability study of best batch

The accelerated stability study report of Valsartan with co-processed Jujube *Ziziphus jujuba* gum revealed that the formulation has not undergone any physical or chemical degradation during the period. There was no significance change in the *in vitro* drug release and drug assay at an interval of 1 month as shown in table 4.

Table 4.Accelerated stability studies report of compression coating floating tablet.

Period	Dissolution (%)			Assay (%)	Appearance
	5 min	10 min	20 min		
Initial	55.4±1.2	85.5±2.3	97.9±2.6	96.13±3.2	Off white
Final (1Mo)	54.3±1.4	84.1±3.2	97.7±1.5	95.44±2.4	Off white

Data are represented as mean± SD, n=3

3.6 Pharmacokinetic report

Based on mathematical data revealed from models from fig.5 to fig.8, it was concluded that the release data was best fitted with first order and Higuchi equation. Higuchi equation explains

the fast release mechanism, the diffusion exponent 'n' values were found to be more than 0.5 for the Valsartan tablets indicating Non-Fickian diffusion.

Based on the Statistical Analysis.It was concluded that, the calculated $F_{(2, 8)}$ value between columns was found to be 1.45which is more than the tabulated value at 5% significant level i.e., P < 1.15. So, the null hypothesis was rejected therefore it was found that there is a significant difference between the natural polymer ratios in co-processed technique (1:1, 1:2,1:3,and1:4).

The calculated $F_{(2, 8) \text{ value}}$ between the rows was found to be 0.45 which is far less than the tabulated $F_{(2, 8)}$value at 5% significant level, i.e., P > 1.15. So, the null hypothesis was accepted. Therefore it was found that there is no significant difference between the natural polymers blended with synthetic polymers by using co-processed technique.

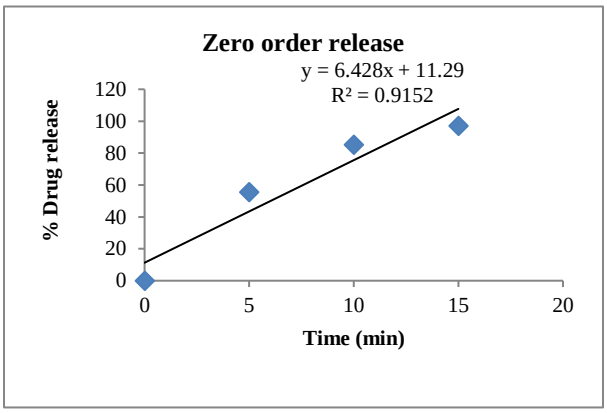

Fig.5. Zero order drug release of Valsartan with co-processed Jujube Ziziphus gum in F2.

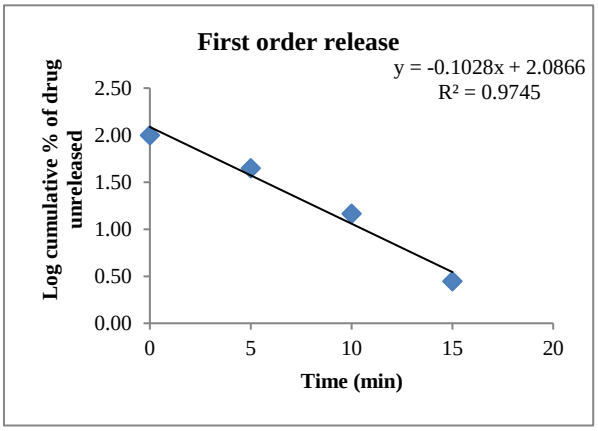

Fig.6.First order drug release of Valsartan with co-processed Jujube Ziziphus gum in F2.

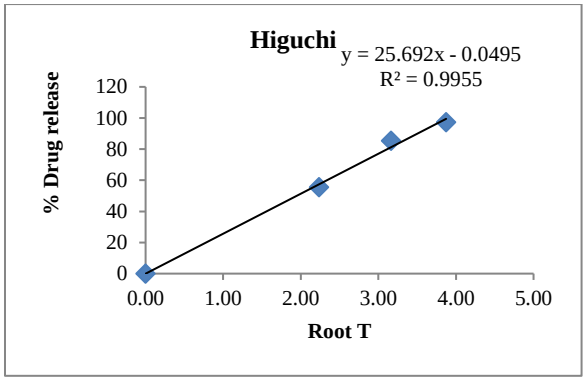

Fig.7 Higuchi graph of drug release of Valsartan with co-processed Jujube Ziziphus gum in F2.

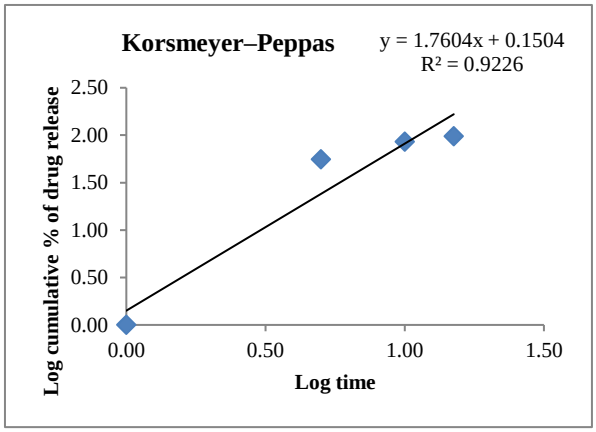

Fig.8.Pappas graph of drug release of Valsartan with co-processed Jujube Ziziphus gum in F2.

4 CONCLUSION

The drug selected for the present investigation was Valsartan, a β selective adrenergic blocking agent, is an orally active antihypertensive agent. The natural polymer chosen for the present investigation was Zizipus gum a natural and high molecular weight hetero polysaccharide gum. Twelve formulations were prepared by varying the concentration of polymersbyusingacoprocessedtechniquewiththenaturalpolymerJujubeZiziphusjujubagumands uperdisintegrantslike sodium starch Glycolate, cross povidone and croscarmellose sodium which retards the drug release over a period of time compared with highly rate synthetic polymer. Those formulations were subjected to various evaluation parameters like melting point, FTIR and pre-compression parameters, post compression parameter like *in vitro* drug release studies and kinetic release. It was further observed that, by increasing the polymer concentration, the drug release was increased. The FTIR spectra revealed that, there was minor

interaction between polymers and drug. Hence concluded that polymers were compatible with Valsartan Flow properties like bulk density, tapped density, compressibility index, Haussler's ratio and angle of repose shown satisfactory results. Formulated tablets were found to be for various physical properties like tablet hardness, weight variation, friability, content uniformity and *in vitro* drug release. *In vitro* drug release of Valsartan tablets shown fast release pattern, which may be attributed to the using various concentrations of natural polymers and synthetic polymer. Based on the results obtained the F2 (6% of SSG with Jujube *Ziziphus jujuba* gum) was considered as the optimum formulation to design fast drug delivery system for quick onset of action.

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