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Formulation and Evaluation of Fast Dissolving Tablets of Rosuvastatin by Utilizing Solid Dispersion Technique

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ABSTRACT

The main purpose of the present study was to evaluate and formulate Fast dissolving tablets of rosuvastatin by using the solid dispersion technique. Rosuvastatin is an anti-hyperlipidemic drug. It is used to treat a high lipid level. Rosuvastatin is a BCS class II drug that shows high permeability and low solubility. The main aim of this study is to increase the solubility of the poorly soluble drug (Rosuvastatin) by solid dispersion method, several methods are used for increasing the solubility of poorly soluble drugs like physical modification, chemical modification, etc. The melting method and solvent evaporation method are widely used for preparing solid dispersions. Several super disintegrants were used like sodium starch glycolate (SSG), croscarmellose sodium (CCS), crospovidone (CP), etc. Hydrophilic polymers are used for the preparation of solid dispersion. Solid dispersion is the most used method to improve the solubility of poorly soluble drugs in water. The solubility of *Rosuvastatin* was investigated in, methanol, phosphate buffer 6.8, phosphate buffer 7.4, 0.1N HCL, and distilled water. Also, the partition coefficient was evaluated to see its hydrophilic and hydrophobic nature. Drug-excipient compatibility was investigated using FTIR spectroscopy. The Rosuvastatin FDTs (F1-F10) were successfully developed by a solid dispersion technique using PEG4000 and mannitol. The developed formulations were evaluated for various pre-compression and post-compression parameters like dissolution, drug release, disintegration time, etc. The Rosuvastatin solubility studies show that the drug is freely soluble in DMF and soluble in methanol, ethanol, and slightly soluble in water. This was further confirmed by the partition coefficient value .i.e. (log P) 2.32. The melting point of the drug was found to be 155^0C. The FTIR study revealed the compatibility between the drug and excipients, and their suitability for the formulation development. The R^2 value was to be 0.9983. Solid dispersion is prepared by the solvent evaporation method in the ratio of 1:2. The results indicate that the solid dispersion of drug with PEG4000 shows increase solubility and dissolution profile. The release of drugs in the tablet was in the order of CP>SSG>CCS.

INTRODUCTION:

Novel drug delivery system is a new methodology to drug delivery that reports the limitations of the traditional drug delivery. A novel drug delivery system is developed, to minimize drug degradation, drug adverse effect, and to increase the bioavailability. The three main goals of a novel drug delivery system (NDDS) is by providing sustained drug release, selected targeting to the site of action, and increased patient compliance. NDDS not only reduces the frequency of administration but also reduces the dose size and dosing frequency which leads to enhanced bioavailability. The oral route of administration is the most preferred route due to its many advantages but many patients group such as elders, children's and patients who are mentally retarded, uncooperative, nauseated, or on reduce liquid intake, have difficulties of swallowing ordinary tablets. To overcome the above-mentioned problems, Pharmaceutical technologist has put in their best efforts to develop a fast-dissolving drug delivery tablets. i.e Orodispersible tablets. Improvement in the extent and rate of dissolution is highly desirable for such compounds. [1]

The techniques are chosen based on certain aspects such as properties of the drug under consideration, nature of excipients to be selected, and the nature of the intended dosage form. It is important to improve the solubility and dissolution rate for poorly soluble drugs because these drugs possess low absorption and bioavailability. A number of methodologies can be adapted to improve the solubilization of poorly water-soluble drugs and further to improve its bioavailability. Solubilization of drug includes micronization, chemical modification, pH adjustment, solid dispersion, complexation, co-solvency, micellar solubilization, hydrotropy, etc. [2]

Two main strategies can be observed in enhancing the solubility of poorly water-soluble drugs. On the one hand, the drug is pre-solubilized in a liquid dosage form, like in self-emulsifying drug delivery systems or microemulsions. When such formulations are released into the lumen of the gut, they disperse to form a fine emulsion, so that the drug remains in solution. Thus, the dissolution step, which often limits the rate of absorption of the drug, can be avoided, on the other hand, the drug is transferred into its amorphous state, maximizing the surface area.[3]

The oral route is the most convenient route of drug administration, cost-effectiveness, patient compliance, and flexibility in drug design. The oral bioavailability depends upon several factors including dissolution rate, aqueous solubility, pre systemic metabolism, and drug

permeability. Poor bioavailability is the major problem for the oral drug delivery system. For a new chemical entity, low aqueous solubility is the major problem. The dissolution of a drug directly depends upon its solubility, greater the solubility better will be the absorption hence it leads to good oral bioavailability. [4]

Enhancement of solubility, dissolution rate, and bioavailability of active compounds is a very challenging task with great relevance inactive compound development. Among all newly discovered chemical entities, about 40% of the drug is lipophilic. These poorly water-soluble drugs having slow drug absorption leads to inadequate and variable bioavailability and gastrointestinal mucosal toxicity. For these reasons is necessary a good formulation to increase the solubility, availability at the site of action, maintaining the stability of active compound. [5]

Solubility is the property of a solid, liquid, or a gaseous chemical substance called solute to dissolve in a solid, liquid, or gaseous solvent to form a homogenous solution of the solute in the solvent. The solubility of a substance fundamentally depends on the solvent used as well as on temperature and pressure. The solvent is generally a liquid, which can be a pure substance or a mixture of two liquids. Solubility occurs under dynamic equilibrium, which means that solubility results from the simultaneous and opposing process of dissolution and phase joining (e.g., Precipitation of solids). Solubility equilibrium occurs when the two processes proceed at a constant rate. Under certain conditions, equilibrium solubility may be exceeded to give a so-called supersaturated solution, which is metastable. [6]

The dissolution of a substance may be described by Noye's Whitney equation.

$$dc/dt = (Cs-C)KDS/Vh \quad \ldots 1$$

Where dc/dt is the rate of increase in C, the concentration of drug in a bulk solution in which dissolution of the solid particle is taking place; K is a proportionality constant; D is the diffusion coefficient of the drug in the solvent; S is the surface area of undissolved solid; V is the volume of the solution; h is the thickness of the diffusion layer around a particle; and Cs is the solubility of the drug in the solvent. If we consider a given drug under well-defined conditions (such as controlled liquid intake), we may assume that D, V, and h are relatively constant values. Thus we can reduce equation (1) to:

$$dc/dt\ KS(Cs-C) \quad \ldots 2$$

Equation (2) shows that the two variables, which may be controlled by the formulation, are the surface area and the solubility of the drug. [2]

MATERIAL AND METHODS:

Rosuvastatin was a gift sample from Mankind pharma Ltd. (Dehradun). Sodium starch glycolate, magnesium stearate, lactose, cp, ccs were obtained from the college laboratory.

METHODS:

Preformulation studies

IDENTIFICATION OF DRUG

THE IDENTIFICATION OF DRUGS WAS PERFORMED BY THE FOLLOWING TECHNIQUE.

A. PHYSICAL EVALUATION: The drug was evaluated for its physical form and organoleptic properties.

B. UV-Spectroscopy: 100 mg of Rosuvastatin was weighed accurately and dissolved in distilled water. The volume of the solution was made up to 100ml. The solution was marked as stock solution-I, the 10ml of stock solution was taken and the volume of solution was made up to 100ml.(stock-II).

1). From stock-II, dilution having concentration 1µg/ml, 2 µg/ml, 4 µg/ml, 6 µg/ml, 8 µg/ml, 10 µg/ml, 12 µg/ml, 14 µg/ml, 16 µg/ml, 18 µg/ml and 20 µg/ml were Prepared.

2). Above the prepared solution were observed in double beam UV-spectrophotometer (systronics) to measure the absorbance, increasing order of concentration.

C. IR SPECTROSCOPY: FTIR spectra were obtained between 400 and 4000 cm-1 by using an IR spectrophotometer (Shimadzu) to confirm complex formation. FTIR spectra of individual ingredients and tablets were taken.

D. MELTING POINT: The melting point of the drug was determined by taking a small amount of the drug in a capillary tube closed at one end and was placed in the melting point apparatus and temperature at which the drug melt was noted.

E. FRIABILITY: Friability of tablets was determined by Roche friabalator (Pharma Test). Twenty tablets were accurately weighed and placed in the drum of friabilator at a speed of 25

rpm. Tablets were allowed to revolve and fall from a height of six inches for 4 min. Then the tablets were de-dusted using a muslin cloth and re-weighed. The friability was measured by calculating % weight loss of 20 FDT's.

WAVELENGTH MAXIMUM OF ROSUVASTATIN

The rosuvastatin calcium stock solution (µg/ml) was prepared in methanol and then scanned using Shimadzu, UV- visible spectrophotometer. The scanning range was between 200nm-400nm.

PARTITION COEFFICIENT

The partition coefficient provides a means of characterizing the lipophilic/hydrophilic nature of the drug which affects the rate and extent of drug absorption.

The drug having the value of log p much greater than 1 and it is classified as lipophilic whereas those with partition are much less than 1 is indicating of the hydrophilic drug.

$$Po/w = (Coil /Caqc)Equilibrium$$

The partition coefficient study was performed by using n-octanol as the oil phase and water as the aqueous phase. Rosuvastatin was taken in a separating funnel. The mixture was shaken continuously using a shaking machine for 30 min until equilibrium was reached and stands for overnight. The two phases were separate within themselves. Then both phases were analyzed for respective drug content by measuring the absorbance using a UV Spectrophotometer at 244nm.

SOLUBILITY STUDIES

The solubility of Rosuvastatin was studying in a various aqueous and non-aqueous solvent. The solubility was determined by exposing as an excess of drug powder to the solvent and the assaying after equilibrium has been established. An excess amount of Rosuvastatin was added to the different solvent and then kept for 24 hrs at room temperature.

QUANTITATIVE ESTIMATION OF DRUG

Preparation of calibration curve of Rosuvastatin in different solvent media like methanol, phosphate buffer pH 6.8, Phosphate buffer pH 7.4, 0.1 N HCL.

10 mg of Rosuvastatin was weight accurately and then dissolved in a respective solvent. The volume of the solution was made up to 100 ml. the solution was marked as a stock solution.

1). From stock solution dilution having concentration , 2 µg/ml, 4 µg/ml, 6 µg/ml, 8 µg/ml, 10 µg/ml, 12µg/ml were prepared.

2) Prepared solutions were observed in double beam UV-Spectrophotometer to measure the absorbance, in increasing order of concentration.

DRUG POLYMER INTERACTION STUDY

The drug-polymer compatibility studies were designed to ensure the stability of the final formulation. The stability studies were studied at different temperature conditions as per the ICH guidelines at temperature 250C ±2 0C / 60% ±5% RH fo real and 40 0C±2 0C/ 75% RH ± 5% for the accelerated stability studies. The samples were withdrawn at regular intervals of time like 0, 5, 10,15,30,60, and 90 days. The final formulation was subjected to stability studies for 3 months. Then the samples were analyzed for thickness, color, hardness, drug content, disintegration time, friability, in vitro drug release studies.

THE DRUG POLYMER RATIO

TABLE NO. 1: DRUG-POLYMER RATIO

S. No.	Material	Quantity (mg)
1	Rosuvastatin	100mg
2	Drug + Mcc	100mg+ 100mg
3	Drug + Magnesium stearate	100mg+ 100mg
4	Drug + PEG-4000	100mg+ 100mg

FORMULATION OF ROSUVASTATIN SOLID DISPERSION

TABLE NO. 2: FORMULATION OF SOLID DISPERSIONS

INGREDIENTS	SD1	SD2	SD3	SD4	SD5	SD6	SD8	SD9
ROSUVASTATIN	100	100	100	100	100	100	100	100
PEG 4000	100	200	300	400	100	200	300	400
MANNITOL	100	200	300	400	100	200	300	400

FORMULATION OF FAST DISSOLVING TABLET OF ROSUVASTATIN BY SOLID DISPERSION

Table No. 3: Formualtion of Fast Dissolving Tablets

INGREDIENTS	F1	F2	F3	F4	F5	F6	F7	F8	F9
SOLID DISPERSION COMPLEX	10	10	10	10	10	10	10	10	10
TALC	1	1	1	1	1	1	1	1	1
CROSCARMELLOSE SODIUM (CCS)				6	8	13			
MAGNESIUM STEARATE	1	1	1	1	1	1	1	1	1
LACTOSE	50	50	50	50	50	50	50	50	50
SODIUM STARCH GLYCOLATE(SSC)							6	8	13
MICROCRYSTALLINE CELLULOSE PH 101 (MCC)	32	30	27	32	30	25	32	30	25
CROSSPOVIDONE	6	8	13						
TOTAL WEIGHT	100	100	100	100	100	100	100	100	100

Evaluation of Fast Dissolving Tablet of Rosuvastatin by solid dispersion

Percent Practical Yield

Percentage practical yield was calculated to know about percent yield, thus it helps in the selection of appropriate ratios of solid dispersion. Solid dispersions were collected and weighed to determine practical yield from the following equation:

$$\text{Percentage Yield} = \frac{\text{Practical Mass (SD)} * 100}{\text{Theoretical Mass (Drug +carrier)}}$$

The angle of repose (θ)

The angle of repose is calculated by measuring the height and radius of the pile.

$$\theta = \tan^{-1}(h/r)$$

Where h is the height, r is the radius and θ is the angle of repose.

Bulk density

$$= M/V_0$$

M = mass of powder

V_0= apparent volume

Tapped density

$$= M/V_f$$

M= weight of powder

V_f= tapped volume

Compressibility Index

Compressibility index is also known as Carr's Index=

$$[(\text{tapped density} - \text{bulk density}) / \text{tapped density}] \times 100$$

Hausner's ratio

$$H = \rho T/\rho B$$

Where, ρT= tapped density, ρB= bulk density

POST COMPRESSION PARAMETERS

Thickness

The thickness of the tablet was determined by using a digital micrometer. Ten tablets were weighed from batch and the average results.

Weight variation

The USP weight variation test is done by weighing 20 tablets individually, calculating the average weight, and comparing the individual weight with average weight.

Content Uniformity

Three factors cause uniformity problems:

- Tablet weight variation
- Segregation of powder mixture
- Uniform distribution of powder

Hardness

It is the force required to break a tablet. It is measured by hardness tester like Monsanto, Phizer, and Erweka, etc.

Friability

The friability is measured by the Roche-type friabilator.

$$\text{Friability} = ([w_o - w]/w_o) \times 100$$

Where, $w_{o=}$ weight of tablet at time zero before the revolution

W= weight of tablet after 100 revolution

Disintegration test

Six tablets were taken randomly from each batch and then placed in USP disintegration apparatus baskets. Apparatus have run till 10 mins until all the tablets get disintegrated.

Dissolution studies

The dissolution studies were performed in USP type I and type II apparatus performed throughout 1 hour pH 6.8 PBS was used as dissolution medium and the temperature is maintained according to normal body temperature and the samples are withdrawn at regular interval of time and analyze for UV- visible spectroscopy at their respective λmax value.

Wetting time

A piece of tissue paper folded which is folded twice is taken in a small Petri dish which contains 6 ml of water, a tablet was put on paper. Then the time required to reach the upper surface of the tablet and to wet completely is the wetting time.

RESULTS AND DISCUSSION

PREFORMULATION STUDY

Solubility Study

Table No. 4: Solubility Study of Drug in Different Solvents

Sr. No.	Solvents	Solubility
1	DMF	Freely soluble
2	DMSO	Soluble
3	Methanol	Soluble
4	Ethanol	Soluble
5	Distilled Water	Slightly soluble

Discussion: From the solubility study we observed that the drug is freely soluble in DMF and soluble in methanol, ethanol, and slightly soluble in water.

Partition coefficient

1. Partition coefficient of Drug in n-Octanol and water

50 mg of drug was dissolved in 25 ml of n- octanol and 25ml of water the solution was taken in a separating funnel and shaken for 30 min and allow to stand for until complete separation was achieved. 1 ml of the aqueous layer was transferred into the 10 ml of volumetric flask and make up the volume with water. The absorbance of the solution was 244 nm.

The partition coefficient (log P) value was found to be =2.3.

2. Partition coefficient of Drug in Octanol and phosphate buffer (pH 6.8)

50 mg of drug was dissolved in 25 ml of octanol and 25ml of Phosphate buffer (pH 6.8) the solution was taken in a separating funnel and shaken for 30 min and allow to stand for until complete separation was achieved. 1 ml of the aqueous layer was transferred into the 10 ml of volumetric flask and make up the volume with water.

The absorbance of the solution was 240 nm.

The partition coefficient (log P) value was found to be =2.32.

3. Partition coefficient of Drug in Octanol and phosphate buffer (pH 7.4)

50 mg of drug was dissolved in 25 ml of octanol and 25ml of Phosphate buffer (pH 7.4) the solution was taken in a separating funnel and shaken for 30 min and allow to stand for until complete separation was achieved. 1 ml of the aqueous layer was transferred into the 10 ml of volumetric flask and make up the volume with water. The absorbance of the solution was 241 nm.

The partition coefficient (log P) value was found to be = 1.3.

Discussion:- From the solubility study we observed that the log p-value for the drug sample was found to be 2.32 for Phosphate buffer pH-6.8 and 1.3for Phosphate buffer pH- 7.4.

Melting Point

Table No. 5: Melting point of Rosuvastatin

S. No.	Melting point (°C)	Average ± S.D.
1.	154.5	155 ± 0.5
2.	155	
3.	156	

n=3 (Mean± S.D.)

Discussion:- As the experimental results revealed the observed melting point value i.e. 155°C of model API was matched with the value given in standard literature. Hence it was used as a preliminary identification tool.

QUANTITATIVE ESTIMATION OF DRUG

PREPARATION OF CALIBRATION CURVE OF ROSUVASTATIN IN DIFFERENT SOLVENT

a) Preparation of calibration curve of Rosuvastatin in methanol (λ_{max} -244nm)

Table No. 6: Calibration curve of Rosuvastatin in methanol

S. No.	CONCENTRATION(µg/ml)	ABSORBANCE (Mean ± S.D.)
1.	2	0.012
2.	4	0.145
3.	6	0.274
4.	8	0.429
5.	10	0.532
6.	12	0.654

n=3 (Mean± S.D.)

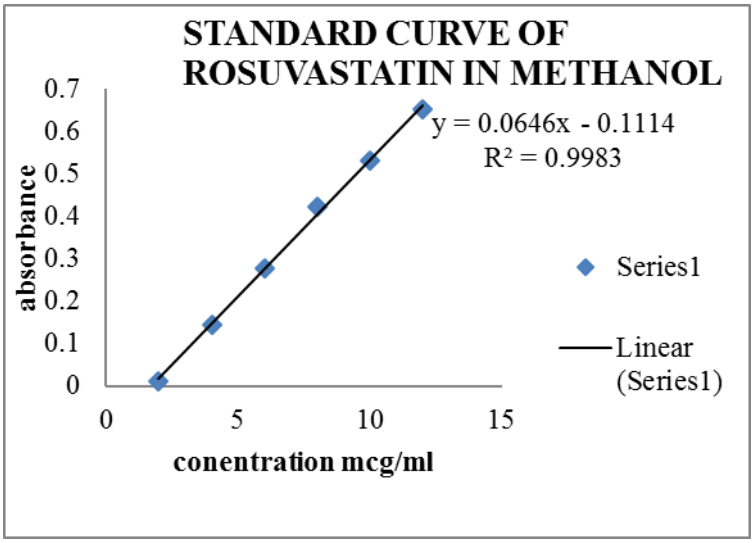

Figure No. 1: Calibration curve of Rosuvastatin in Methanol

b) Preparation of calibration curve of Rosuvastatin in phosphate buffer pH 6.8 (λ_{max} – 240 nm)

Table No. 7: Calibration curve of Rosuvastatin in phosphate buffer pH 6.8

n=3 (Mean± S.D.)

S. No.	Concentration (µg/ml)	Absorbance(λ_{max}284.5nm)
1	2	0.016
2	4	0.135
3	6	0.280
4	8	0.0429
5	10	0.551
6	12	0.716

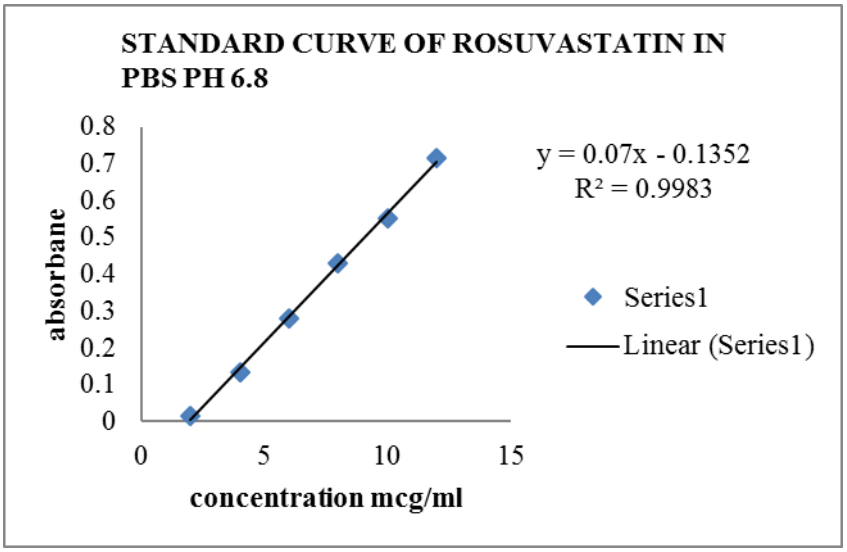

Figure No. 2: Calibration curve of Rosuvastatin in pH 6.8

c) Preparation of calibration curve of Rosuvastatin in 0.1N HCl (λ_{max} –243nm)

Table No. 8: Calibration curve of Rosuvastatin 0.1N HCl

S. No.	Concentration(µg/ml)	Absorbance (λ_{max} 243nm)
1	2	0.08
2	4	0.22
3	6	0.34
4	8	0.45
5	10	0.58
6	12	0.70

n=3 (Mean± S.D.)

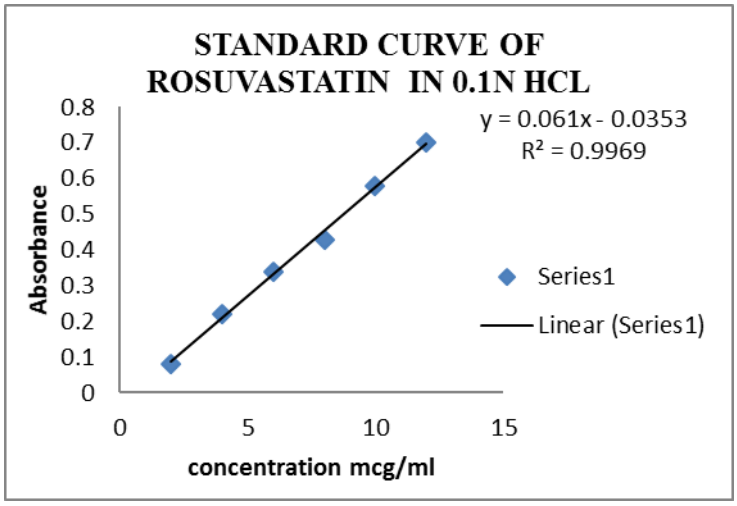

Figure No. 3: Calibration curve of Rosuvastatin in 0.1N HCL

d) Preparation of calibration curve of Rosuvastatin in phosphate buffer pH- 7.4(λ_{max} – 242nm)

Table No. 9: Calibration curve of Rosuvastatin in phosphate buffer pH-7.4

n=3 (Mean± S.D.)

S. No.	Concentration(µg/ml)	Absorbance (λ_{max} 240nm)
1	2	0.051
2	4	0.17
3	6	0.29
4	8	0.459
5	10	0.561
6	12	0.719

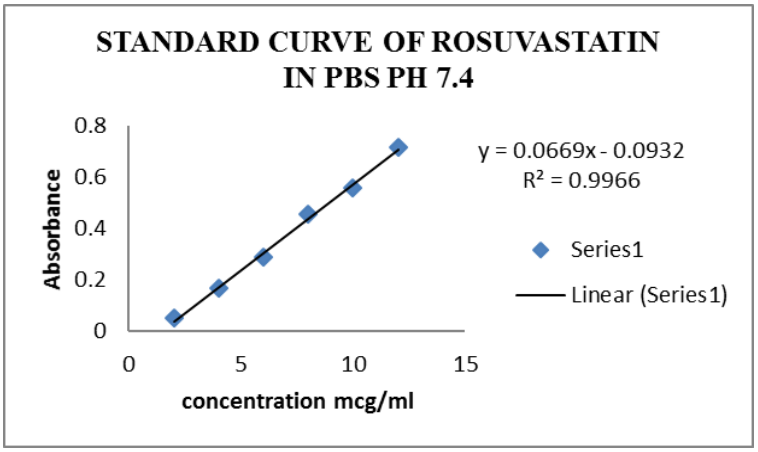

Figure No. 4: Calibration curve of Rosuvastatin in pH 7.4

Discussion:- As per the experimental result all four prepared standard curve having a regression value above 0.95, which signify the reproducibility and linearity.

DRUG EXCIPIENTS COMPATIBILITY STUDY

The drug and excipient were taken in a 1:1 ratio and mixed properly using a polybag. Now the mixtures were transferred into the glass vials and samples were placed in the stability chamber at 40^0C for 21 days. Glass vials filled with plane drug and polymers were also placed in the same way.

Through Fourier Transform Infrared Spectroscopy: Drug excipients compatibility study was confirmed by FTIR analysis.

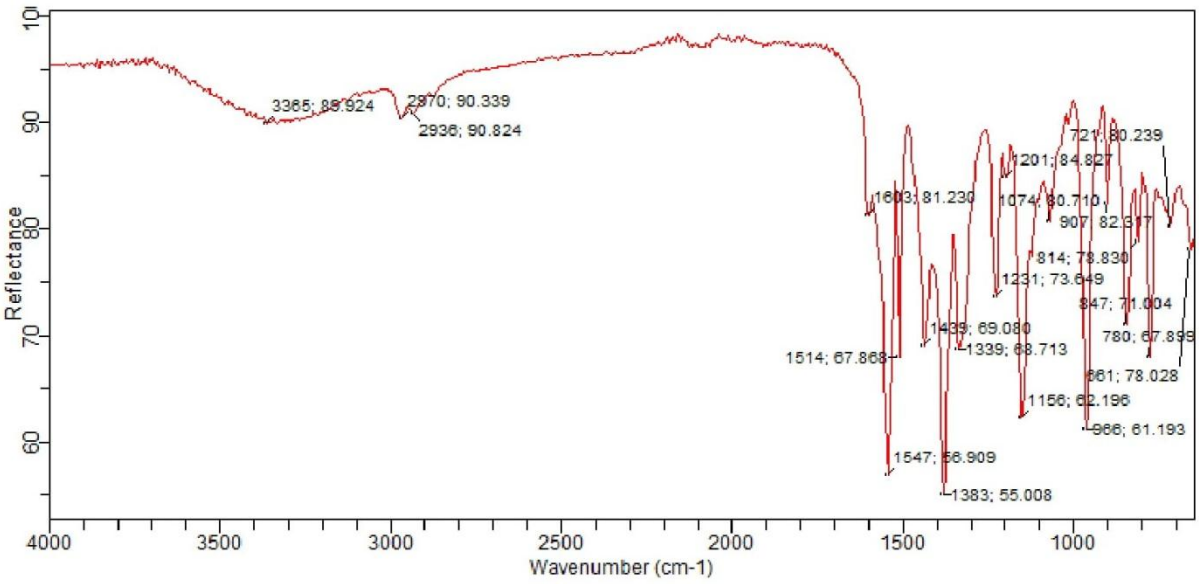

Figure No. 5: FTIR spectra of pure drug (Rosuvastatin)

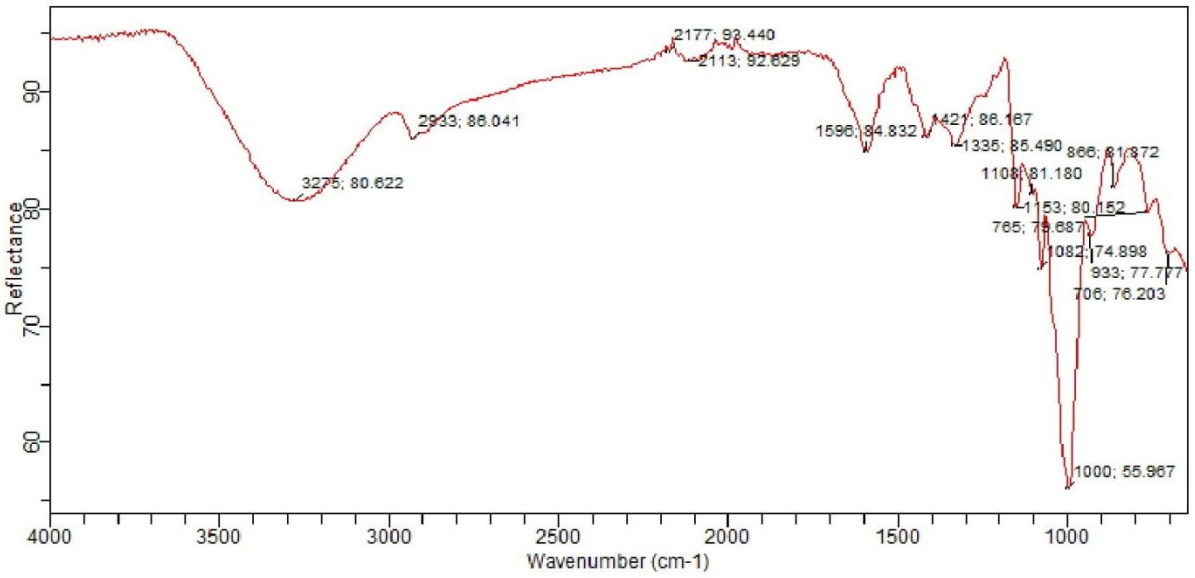

Figure No. 6: FTIR spectra of SSG

PRE-COMPRESSION PARAMETERS

Table No. 10: Pre-compression parameters of FDTs of Rosuvastatin

Batch	Angle of Repose(θ)	Bulk density (gm/cm^3)	Tapped density (gm/cm^3)	Carr's index (%)	Hausner ratio
F1	29.14 ± 0.47	0.61 ± 1.43	0.71 ± 0.49	14.04 ± 1.49	1.162 ± 0.12
F2	26.99 ± 1.59	0.62 ± 0.49	0.71 ± 1.13	13.59 ± 0.69	1.144 ± 0.79
F3	29.77 ± 0.32	0.60 ± 0.41	0.70 ± 1.35	14.23 ± 1.76	1.165 ± 0.68
F4	28.64 ± 0.70	0.61 ± 0.68	0.71 ± 0.88	14.88 ± 0.51	1.177 ± 0.80
F5	30.15 ± 1.11	0.58 ± 1.55	0.68 ± 0.56	13.39 ± 0.91	1.170 ± 0.78
F6	29.43 ± 1.13	0.59 ± 0.69	0.69 ± 0.76	13.19 ± 0.59	1.151 ± 1.19
F7	30.59 ± 0.39	0.61 ± 0.10	0.69 ± 0.85	13.02 ± 0.16	1.149 ± 1.07
F8	28.87 ± 0.68	0.62 ± 0.58	0.71 ± 0.61	12.43 ± 0.68	1.141 ± 0.75
F9	29.16 ± 0.54	0.63 ± 0.52	0.74 ± 1.66	13.78 ± 0.79	1.172 ± 0.78

POST COMPRESSION PARAMETERS

Table No. 11: Post-compression parameters of FDTs of Rosuvastatin

Batch	Hardness Kg/cm^2	Weight variation (mg)	Thickness (mm)	Friability (%)	Drug content (%)
F1	3.8 ± 0.23	250 ± 0.60	2.75 ± 0.20	0.44 ± 0.69	98.42 ± 0.21
F2	4.1 ± 0.14	249 ± 0.21	2.76 ± 0.12	0.32 ± 0.29	98. 71 ± 0.19
F3	4.2 ± 0.19	250 ± 0.41	2.74 ± 0.34	0.37 ± 0.41	99.59 ± 0.14
F4	4.3 ± 0.15	249 ± 0.19	2.77 ± 0.67	0.30 ± 0.12	97.38 ± 0.55
F5	4.4 ± 0.12	248 ± 0.07	2.72 ± 0.81	0.29 ± 0.08	98.75 ± 0.81
F6	4.1 ± 0.20	250 ± 0.19	2.74 ± 0.26	0.47 ± 0.54	99.73 ± 0.20
F7	4.0 ± 0.18	251 ± 0.49	2.71 ± 0.27	0.45 ± 0.58	98.24 ± 0.49
F8	4.1 ± 0.10	246 ± 0.50	2.72 ± 0.39	0.46 ± 0.41	99.65 ± 0.83
F9	4.2 ± 0.11	247 ± 0.64	2.72 ± 0.43	0.43 ± 0.20	99.30 ± 0.25

Table No. 12: *In-vitro* disintegration time, wetting time, In vitro dispersion time and water absorption ratio of FDTs of Rosuvastatin

Batch	In vitro Disintegration time (sec)	Wetting time (sec)	In vitro dispersion time (sec)	Water Absorption ratio (%)
F1	39 ± 0.49	51.29 ± 0.31	48.14 ± 0.65	54.23 ± 1.12
F2	28 ± 0.90	30.41 ± 1.01	37.21 ± 1.16	60.45 ± 0.65
F3	26 ± 0.18	31.65 ± 1.45	35.17 ± 0.41	62.68 ± 1.26
F4	29 ± 0.11	40.02 ± 0.29	42.69 ±0.77	53.56 ± 0.49
F5	22 ± 0.87	34.61 ± 1.41	39.24 ± 0.54	62.17 ± 1.11
F6	18 ± 0.32	26.45 ± 0.52	33.45 ± 0.67	69.43 ± 1.04
F7	33 ± 0.43	45.67 ± 0.21	44.72 ± 0.89	57.79 ± 1.02
F8	27 ± 0.59	37.39 ± 0.59	40.78 ± 0.99	60.20 ± 0.81
F9	25 ± 0.21	29.60 ± 0.75	38.45 ± 0.23	65.88 ± 0.32

DISSOLUTION PROFILE OF SOLID DISPERSION

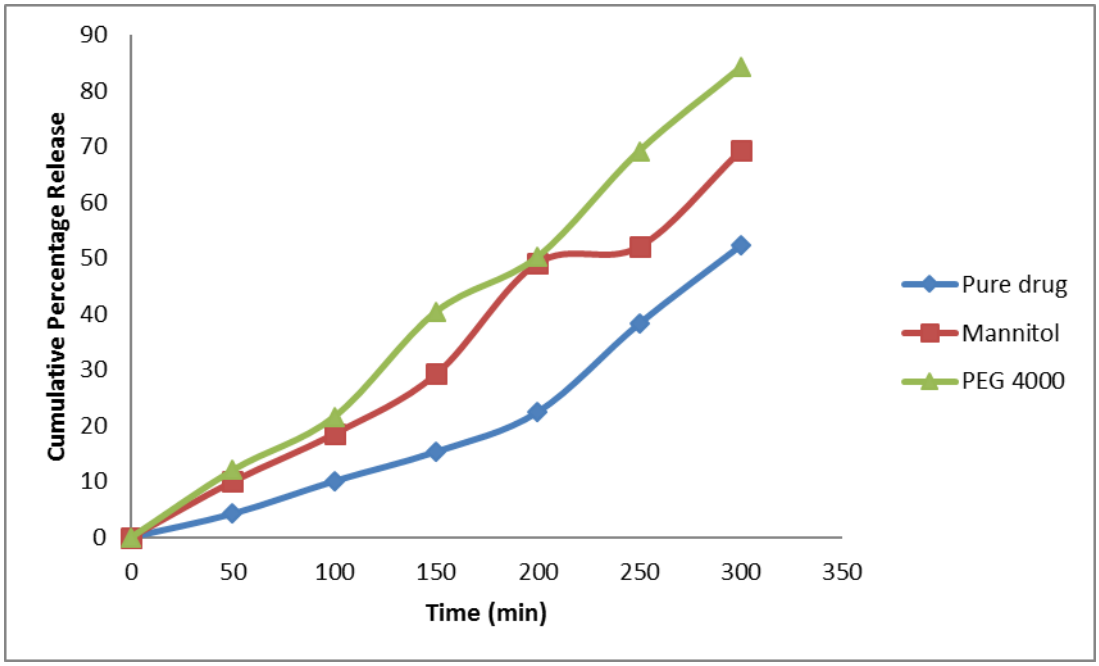

Figure No. 7: Dissolution profile of solid dispersion

Table No. 13: Cumulative Percentage Drug Release

Time	Cumulative Percentage Release		
	Pure drug	Mannitol	PEG 4000
30	4.21	10.01	12.05
60	10.06	18.56	21.62
90	15.32	29.22	40.41
120	22.41	49.17	50.26
180	38.27	52.08	69.20
240	52.55	69.29	84.16

DISINTEGRATION TIME OF FDTs OF ROSUVASTATIN

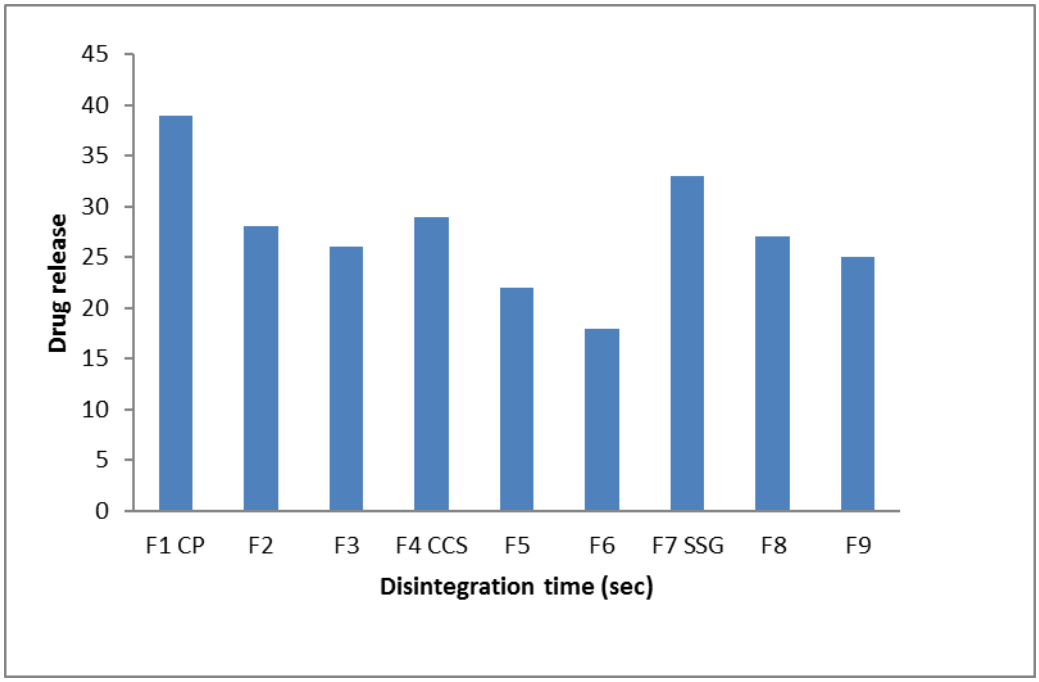

Figure No. 8: Disintegration time for FDTs of Rosuvastatin

IN-VITRO DRUG RELEASE STUDY

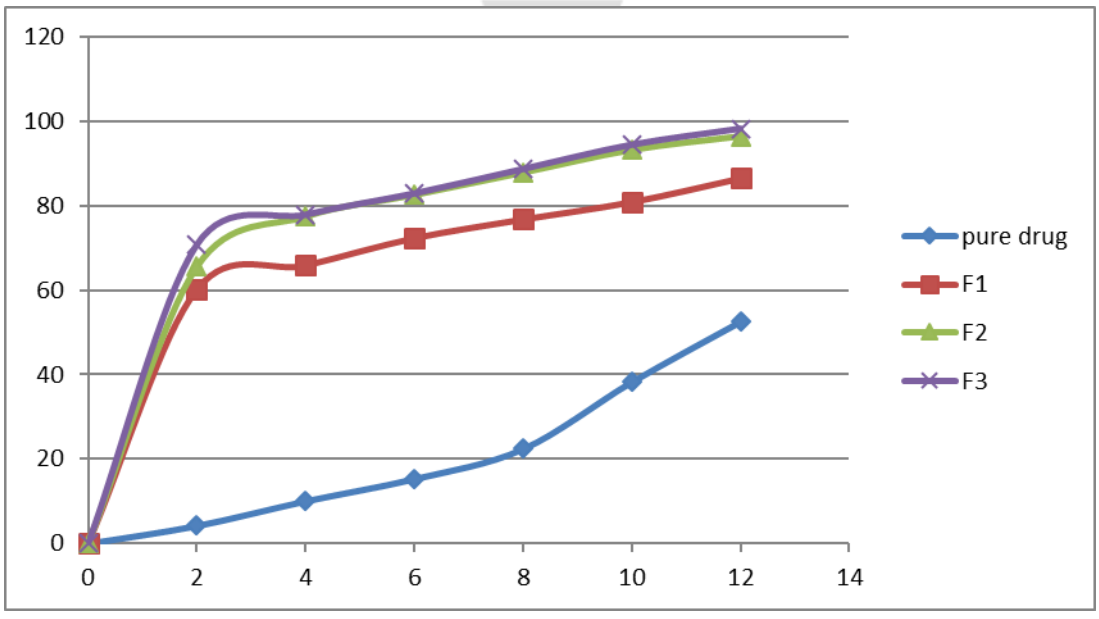

Figure No. 9: *In-vitro* drug release of FDTs with crospovidone

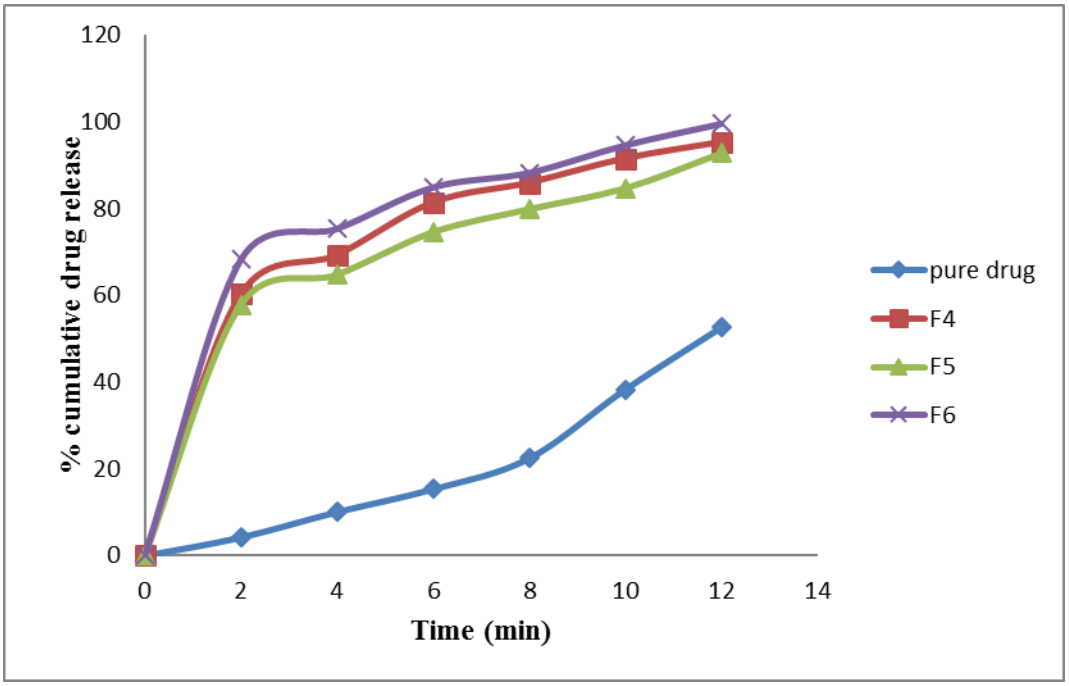

Figure No. 10: *In-vitro* drug release of FDTs with sodium starch glycolate

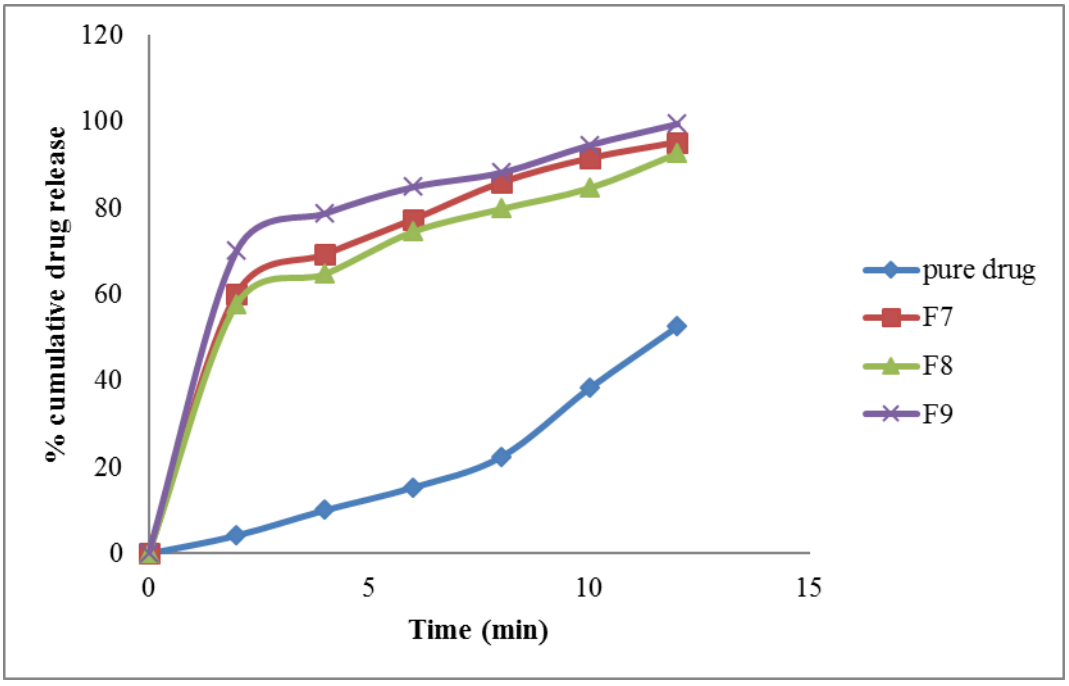

Figure No. 11: *In-vitro* drug release of FDTs with croscarmellose sodium

CONCLUSION:

The present study was done to increase the solubility of poorly soluble drugs. Solubility is a major problem. According to BCS class II shows poor solubility. The main aim of this study is to formulate the fast dissolving tablets of rosuvastatin by using the solid dispersion method.

There are several approaches for solubility enhancement. Solid dispersion shows a faster dissolution profile. Solid dispersion is prepared by the solvent evaporation method. It is a widely used method. Solid dispersion is used both in industrial scale as well as laboratory scale. For lipophilic drugs, solid dispersion is the best of the delivery drug by the oral route. Drugs with poor aqueous solubility show poor dissolution and absorption. Several surfactants and co-surfactants are used to increase the solubility of the drug. The selection of excipient and carrier also plays a major role in solubility enhancement. Solid dispersion is prepared by the solvent evaporation method in the ratio of 1:2. The solid dispersion is prepared with PEG 4000 and mannitol. Solid dispersion of drug with PEG 4000 shows increase solubility and dissolution profile. Solid dispersions were analyzed by several pre and post-evaluation parameters like dissolution, drug release, disintegration time, etc. The release of drug in tablet formulations due to the presence of several superdisintegrants were in the order of CP > SSG > CCS.

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