CONCLUSION:

Inclusion complexes of Rosuvastatin Calcium and Atorvastatin Calcium with βCD and HP-βCD formed in 1:1 complexes by three techniques such as physical mixture, kneading and Spray dryings method.

- All prepared complexes showed improved dissolution when compared to drug alone and this was characterized by XRD, DSC and SEM studies.
- The dissolution of Rosuvastatin Calcium and Atorvastatin Calcium from inclusion complexes prepared with HPβ-CD (1:1M) by physical mixture, kneading method spray drying method was showed to higher compared with the pure drug and spray drying method showed higher rate of dissolution compared with the physical mixture, kneading method.
- Hence from the results it can be conclude to the spray drying method was best method given perfect inclusion complex with HPβ-CD and was selected to formulate fast releasing tablets.

Fast dissolving tablets formulations of Rosuvastatin Calcium and Atorvastatin Calcium was successfully attempted by Direct compressions technique. From above findings obtained, the following conclusions showed that.

- The inclusion complexes of Rosuvastatin Calcium with HP-βCD and Atorvastatin Calcium with HP-βCD by spray dried complexes were best and further selected to formulation of fast dissolving tablets.
- The IR spectrums showed that, excipients and polymers were compatible with drug.
- The prepared fast dissolving tablets shown good physiochemical parameter such as, Tablets weight variations, friability, hardness and drug content uniformity.
- The in vitro disintegrations time, wetting time and dispersion time and showed good results in both drugs. Water absorption ratio indicates good absorptivity in all prepared formulations.
- The in vitro drug release for all prepared formulations of tablets shows, 85% to 99% drug release were within 12 minutes. Formulation Rp8 was showed faster drug release, disintegration and dispersion in comparison to Ap8 formulation.
The Formulation Rp8 & Ap8 showed faster drug release in compared to the conventional marketed formulation of Rosuvastatin calcium and Atorvastatin Calcium tablets.

Overall, the direct compression method of formulation Rp8 and Ap8 showed good results.

Formulation Rp8 & Ap8 optimized formulations were chosen for stability study. The formulations Rp8 & Ap8 shows not much difference in any parameters after 30 days. From these results it was conclude that, formulations Rp8 & Ap8 were showed to be more stability.

Finally, the conclusion was, the Rp8 formulation showed, higher the rate of dissolution, disintegration, dispersion and water absorption ratio compared with the formulation Ap8.

Further detailed investigation and elaborative study needs to be carried out for its pre-clinical and clinical studies for providing platform to further correlate the effect of increasing solubility, bioavailability and optimization of this two drug delivery system of Rosuvastatin calcium and Atorvastatin Calcium in the form of FDT.
SUMMARY:

The fast dissolving tablets are gaining more importance and prominence to a newel drug delivery systems. In this research work, an effort was made to enhance the solubility of poorly soluble drug and formulate it into the fast dissolving tablets of Rosuvastatin calcium and Atorvastatin calcium then, evaluate the pre and post compression parameters of the tablets. The primary approach is to enhance the solubility and disso rate of Rosuvastatin calcium and Atorvastatin Calcium by complexation techniques using β-cyclodextrins and HP-β-cyclodextrins. Complexes were prepared using the following methods.

- physical mixture
- Kneading method
- Spray drying method

The samples was characterized by FTIR, XRD, DSC, SEM studies and evaluation by In vitro disso studies, The complexes of Rosuvastatin Calcium and Atorvastatin Calcium with β-cyclodextrins and HP-β-cyclodextrins formulated by Spray drying technique gave a good drug release profile, compared to physical mixture and kneading method. Details are as follows.

Drug Contents Uniformity of Rosuvastatin calcium inclusion complexes:
The % of drug contents uniformity of all formulations of Rosuvastatin calcium was found within limits to acceptable.

Aqueous solubility of Rosuvastatin calcium inclusion complexes:
Aqueous solubility of Rosuvastatin calcium with βCD and HP-βCD in physical mixtures was significantly increased. The aqueous solubility for the formulations prepared with kneading technique was found to be further increased. The solubility of formulations formulated by spray drying techniques found to be significantly more compared to those methods.
**In-vitro Disso study of Rosuvastatin calcium inclusion complexes:**

The drug disso data of Rosuvastatin calcium with β-CD and HPβ-CD of all formulations systems. The pure drugs and its complexes were formulated by the three different methods has shown a faster disso rate when compared to drug alone.

The disso rate of formulations RF$_7$ and RF$_{13}$ was markedly enhanced by the complexation with β-CD and RF$_{10}$ and RF$_{16}$ formulated with HP-βCD by kneading method and spray drying methods were shown enhanced disso rate. The dissolution rates increases as the concentrations of β-CD and HP-βCD increases. The rate of disso is higher in inclusion complexes formulated with the method of spray drying compared with physical and kneading method. The most of the formulations showed zero order release mechanisms.

**PXRD Study of Rosuvastatin calcium inclusion complexes:**

The thermograms of Rosuvastatin calcium with βCD, obtained in series of more peaks which is shown as intensive in nature and which has appears of their crystalline in nature. PXRD spectra of formulation RF$_1$ formulated with the method of physical mixture is shown superimposition to the each components of the drug and complexing agent in the PXRD spectra, which is indicated as, there is slightly formation of new structure. The inclusion complexes formulated by kneading technique, the formulation RF$_7$ has shown a spectra patterns quite same to that of the physical method. The inclusion complexes formulated by Spray drying technique, the formulation RF$_{13}$ has showed low intensity with less peaks in the spectra. This indicated that, the complexes formulated by the Spray drying technique obtained, which is less crystalline nature than the complex prepared by physical and kneading techniques.

The thermograms of Rosuvastatin calcium and HP-βCD obtained in series of more peaks which is shown as intensive in nature and which has appears of their crystalline in nature. PXRD spectra of formulation RF$_4$ formulated with the method of physical mixture is shown superimposition to the each components of the drug and complexing agent in the PXRD spectra, which is indicated as, there is slightly formation of new structure. The inclusion complexes formulated by kneading technique, the formulation
RF10 has shown a spectra patterns quite same to that of the physical method. The inclusion complexes formulated by Spray drying technique.

The formulation RF16 has showed low intensity with less peaks in the spectra. This indicated that, the complexes formulated by the Spray drying technique obtained, which is less crystalline and sharp peaks than the complex prepared by physical and kneading techniques.

**DSC Study of Rosuvastatin calcium inclusion complexes:**

The thermo nature of the β-cyclodextrins and HP-βCD complexes was analyzed by Differential Scanning Colorimetry which shows to confirmation of the formulation of complexes. When the, other molecule of drug is inserted in to the cyclodextrins cavity, their boiling, meltings and sublimations point shifted to a temperatures ranges which is different to the individual drug and complexing agent or disappear at the temperature ranges, where the cyclodextrins lattices is decomposes.

The Rosuvastatin calcium of DSC Spectra was shows an endothermic peaks corresponds to its melting points. The βCDs, DSC spectrum was shown the endotherm effect which is a very broad peak, which shows the releases water molecules at 80 to 90°C at maximum peak and shows the peak at 90.14°C corresponds to its melting ranges. The HP-βCDs, DSC spectrum was shown the endotherm effect which is a very broad peak, which shows the releases water molecules at 80 to 140°C at maximum peak and shows the peak at corresponds to its melting ranges.

The DSC spectrum of Rosuvastatin calcium with βCD (1:1 M) formulated by kneading by physical mixture i.e., the formulations of RF1 and RF7 has shown the peaks, which is endothermic in nature. This is because of shift of characteristics peaks of drugs was formed, indicated a strong interactions between the drugs and complexing agent βCD. The formulation RF13 formulated by spray drying technique has shown a peak, which is a very broad endothermic in nature. This is because of shift of characteristics peak of drug was formed, indicated a strong interactions between the drugs and complexing agent
βCD. The DSC spectrum of Rosuvastatin calcium with HP-βCD formulated by kneading by physical mixture. The formulations of RF₄ and RF₁₀ has shown the peaks which is endothermic in nature. This is because of shift of characteristics peaks of drugs with complexing agents, indicated a strong interactions between the drugs and complexing agent HP-βCD. The formulation RF₁₆ formulated by spray drying technique has shown very broad endothermic peaks. This is because of shift of characteristics peaks of drug with complexing agents, indicated a very strong interactions between the drug and complexing agent HP-βCD.

**SEM Study of Rosuvastatin calcium inclusion complexes:**
The SEM study is to assess the microscopic aspects of drug Rosuvastatin calcium, polymers like β-CD and HP-βCD and its complexes. This method was use to know the existence of a single component in the preparation of drug complexations. The Pure drug of Rosuvastatin calcium was characterizes by the presence of regular sized crystalline particles. The SEM photos formulations RF₁₆ of spray dried inclusion complexes shows the characteristic morphological nature of the preparation, generally formed in this technique that are smaller sized particle tends to aggregated with each other, indicates the existens of an amorphous nature product with the one components in the complexation thus suggests the maximum complexations.

So, this inclusion complex (RF₁₆) was used to formulate the fast dissolving tablets by direct compressions method. Crosspovidone, crosscarmellose, sodium starch glycolate, were used as superdisintegrating agents. The formulation prepared drug with crosspovidone formulations of Rosuvastatin Calcium showed good evaluation parameters, compare with others superdisintegrating agents. To compering with the Rosuvastatin calcium was showed good release.
Evaluation of FDT tablets:

Precompression parameters:
The formulated fast dissolving tablets were evaluated for the following parameters Flow properties like,

- Angle of repose.
- Loose bulk density.
- Tapped density.
- % Carr"s Index.

The above all parameters of formulations Rp1 to Rp9 and Ap1 to Ap9, which showed good flow properties.

Evaluation of Precompression parameter:

Angles of repose:
The angles of repose values (Rp1 to Rp9) of all the formulations for Rosuvastatin calcium and Atorvastatin calcium were found to be in the range, which indicated a better flow properties of the powders.

Tapped density Bulk density:
The values of all formulations (Rp1 to Rp9) of Rosuvastatin calcium lies between the acceptable ranges. These results help to calculate the % of the powder compressibility and which is within the acceptable limits.

Percent of compressibility:
The % compressibility of (Rp1 to Rp9) all the formulations for Rosuvastatin calcium lies within the range. That indicted formulations are showing good compressibility.

Post-compression parameters Rosuvastatin calcium:
Formulations (Rp1 to Rp9) of all the formulations of Rosuvastatin calcium were subjected to evaluations of different official specification.

Shape and colour of tablets:
Rosuvastatin calcium tablet formulations were randomly picked and evaluated its shape
and colour, all batches showed white, circular, flat and scored on one side.

**Uniformity of thickness:**

The values (Rp1 to Rp9) of the formulations of Rosuvastatin calcium are almost uniform in thickness.

**Hardness test:**

The tablets hardness for formulations (Rp1 to Rp9) of Rosuvastatin calcium was found to be within the range. The hardness of all the formulations was shown the sufficient hardness and almost uniform possess good mechanical strength.

**Friability test:**

The results of Rosuvastatin calcium tablets were found within the approved range (<1%) and all the formulations (Rp1 to Rp9) possesses good mechanical strength.

**Weights variations test:**

The % of weight variation of Rosuvastatin calcium (Rp1 to Rp9) of all the formulation was found to be within the acceptable limit (± 7.5%).

**Drug contents uniformity:**

The contents uniformity of formulations (Rp1 to Rp9) of Rosuvastatin calcium and Atorvastatin calcium was found to be within the acceptable range.

**Wetting time:**

The formulation (Rp1 to Rp9) of Rosuvastatin calcium showed quick wetting time within the acceptable range. These results were obtained due to the ability of capacity of absorption of water and swelling. The all superdisintegrant have a better water absorption capacity and cause the swelling.

**Water absorptions ratio:**

Water absorptions ratio of formulations (Rp1 to Rp9) of Rosuvastatin calcium were shown the results which is within the acceptable range. Water absorption ratio Rosuvastatin calcium fast dissolving tablets formulations concentration of the
superdisintegrant increases with increase from 5 to 1%. More the superdisintegrant concentration greater was the water uptake and therefore increases in water absorptions ratio.

**Disintegration time:**
All the formulations of (Rp1 to Rp9) of Rosuvastatin calcium were shown, the disintegration time less than 68-70seconds. Crospovidone showed less disintegrating time compared with the Crosscarmellose and sodium starch glycolate. In case of the Crospovidone super disintegrating agent, increasing the disintegration time because of high gelling"s tendency of superdisintegrants. The Crospovidone which causes swellings of tablets mass with subsequent retardation of the disintegration.

**Dispersion time:**
The rapid dispersion of the tablets were observed in all the formulations (Rp1 to Rp9) of Rosuvastatin calcium. This indicated that the efficiency of superdisintegrants was in the orders Crospovidone > Crosscarmellose > Sodium Starch Glycolate.

This parameter gives the superdisintegrating agents information regarding its nature in of the formulation. The in vitro dispersion time was measure by observing the time taken by the fast dissolving tablets to undergo uniformity in the dispersion in 6.8 pH buffer.

**In vitro disso studies:**
The results which are got in the *in vitro* drug releases for (Rp1 to Rp9) of Rosuvastatin calcium the formulation formulated by direct compressions technique. Here in all batch of (Rp1 to Rp9) the disso rates were obtained to be increases linearly with increasing superdisintegrants concentrations. The Rp8 showed good drug release profile and these two drug release were highest drug release compared to all formulations at the ends of 12 min. The markedly enhancement in disso rates of formulation Rp8 formulated by direct compression technique with 15% of Crospovidone compared with the 15% of Crosscarmellose and Sodium Starch Glycolate superdisintegrants. By the
dissolution data of formulations (Rp1 to Rp9) it was concluded that the formulation of Rp8 prepared with Crosspovidone superdisintegrant was showed the highest drug release, compared with the crosscarmelllose and sodium starch glycolate.

**Curve fitting analysis:**
All formulation (Rp1 to Rp9) found to followed Higuch, rate of release, this may be diffusion.

**Stability studies:**
The stability study were carried out for the formulations of Rp8 stored at the following temperature and humidity conditions such as, 25°C/60% RH and 40°C/75% RH for 30 days. The various parameters were evaluated such as, hardness, friability, drug contents uniformity, *in vitro* disintegrations, wetting time were analyzed at a different time of interval such as, 10, 20 and till a periods of 30 day. There was not much variations observed in any parameters throughout study period of time.

**The drug dissolution study of formulation Rp8:**
The drug dissolution study of formulation Rp8 was carried out. The formulation Rp8 showed the 82.39 % drug release.

**Post compressions parameter:**
The shape and colours of all formulations were found to be white in colour, circular fast dissolving tablets and score on one side. The thicknesses of the fast dissolving tablets were found uniforms in friability and hardness values of all the prepared formulations (Rp1 to Rp9). Tablets formulated by direct compression method were within the limits and found to be mechanically stable formulations. The drug content uniformity and % weight variation out for all the eighteen formulations were found to be within the acceptable limits. The Rp1 to Rp9 formulation batches of tablets, parameters such as, *in vitro* disintegration, dispersion and wetting time were found to be faster.

The water absorption ratio showed good absorptivity for all the formulations. The *in vitro* disso results was showed that maximum cumulative % drug release more in the formulation Rp8 when compared to the formulation Rp1 to Rp9, and the formulation.
Kinetics of release profiles for five different models such as, zero order, first order, Higuchi Matrix, Peppas and Hixson-Crowell equation kinetics. Kinetics of release profiles for five different models indicated that the more formulations followed the best Higuchi models of Rp1 to Rp9, formulations. The stability studies were conducted formulations of Rp8 stored at the following temperature and humidity conditions such as, 25°C/60% RH and 40°C/75% RH for 30 days. The various parameters were evaluated such as, hardness, friability, drug contents uniformity, in vitro disintegrations, wetting time were analyzed at a different time of interval such as, 10, 20 and till a periods of 30 day. There was not much variation observed in any parameters throughout the study period of time. The best selected formulations such as, Rp8 was found to be stable.
Summary of Atorvastatin Calcium FDT

Drug Contents Uniformity of Atorvastatin Calcium inclusion complexes:
The % of drug contents uniformity of all formulations of Atorvastatin calcium was found within limits to acceptable.

Aqueous solubility of Atorvastatin Calcium inclusion complexes:
Aqueous solubility of Atorvastatin calcium with βCD and HP-βCD in physical mixtures was significantly increased. The aqueous solubility for the formulations prepared with kneading technique was found to be further increased. The solubility of formulations formulated by spray drying techniques found to be significantly more compared to those methods.

In-vitro Disso study of Atorvastatin Calcium inclusion complexes:
The drug disso data of Rosuvastatin calcium and Atorvastatin calcium with β-CD and HPβ-CD of all formulations systems. The pure drugs and its complexes were formulated by the three different methods has shown a faster disso rate when compared to drug alone. The disso rate of formulations AF₇, and AF₁₃ was markedly enhanced by the complexation with β-CD and AF₁₀ and AF₁₆ formulated with HP-βCD by kneading method and spray drying methods were shown enhanced disso rate. The dissolution rates increases as the concentrations of β-CD and HP-βCD increases. The rate of disso is higher in inclusion complexes formulated with the method of spray drying compared with physical and kneading method. The most of the formulations showed zero order release mechanisms.

DSC Study of Atorvastatin Calcium inclusion complexes:
The thermograms of Atorvastatin calcium with βCD, obtained in series of more peaks which is shown as intensive in nature and which has appears of their crystalline in nature. PXRD spectra of formulation AF₁ formulated with the method of physical mixture is shown superimposition to the each components of the drug and complexing agent in the PXRD spectra, which is indicated as, there is slightly formation of new structure. The inclusion complexes formulated by kneading technique, the formulation AF₇ has shown a spectra patterns quite same to that of the physical method. The inclusion complexes
formulated by Spray drying technique, the formulation AF_{13} has showed low intensity with less peaks in the spectra. This indicated that, the complexes formulated by the Spray drying technique obtained, which is less crystalline nature than the complex prepared by physical and kneading techniques. The thermograms of Atorvastatin calcium and HP-\(\beta\)CD obtained in series of more peaks which is shown as intensive in nature and which has appears of their crystalline in nature. PXRD spectra of formulation AF_{4} formulated with the method of physical mixture is shown superimposition to the each components of the drug and complexing agent in the PXRD spectra, which is indicated as, there is slightly formation of new structure. The inclusion complexes formulated by kneading technique, the formulation AF_{10} has shown a spectra patterns quite same to that of the physical method. The inclusion complexes formulated by Spray drying technique.

The formulation AF_{16} has showed low intensity with less peaks in the spectra. This indicated that, the complexes formulated by the Spray drying technique obtained, which is less crystalline and sharp peaks than the complex prepared by physical and kneading techniques.

**DSC Study of Atorvastatin Calcium inclusion complexes:**

The thermo nature of the \(\beta\)-cyclodextrins and HP-\(\beta\)CD complexes was analyzed by Differential Scanning Colorimetry which shows to confirmation of the formulation of complexes. When the, other molecule of drug is inserted in to the cyclodextrins cavity, their boiling, melting and sublimations point shifted to a temperatures ranges which is different to the individual drug and complexing agent or disappear at the temperature ranges, where the cyclodextrins lattices is decomposes.

The Atorvastatin calcium of DSC Spectra was shows an endotherm peaks corresponds to its melting points. The \(\beta\)CD of DSC spectrum was shown the endotherm effect which is a very broad peak, which shows the releases water molecules at 80 to 90°C at maximum peak and shows the peak at 90.14°C corresponds to its melting ranges. The HP-\(\beta\)CDs, DSC spectrum was shown the endotherm effect which is a very broad peak, which shows the releases water molecules at 80 to 140°C at maximum peak and shows
the peak at corresponds to its melting ranges. The DSC spectrum of Atorvastatin calcium with βCD (1:1 M) formulated by kneading by physical mixture i.e., the formulations of AF₁ and AF₇, has shown the peaks, which is endothermic in nature.

This is because of shift of characteristics peaks of drugs was formed, indicated a strong interactions between the drugs and complexing agent βCD. The formulation AF₁₃, formulated by spray drying technique has shown a peak, which is a very broad endothermic in nature. This is because of shift of characteristics peak of drug was formed, indicated a strong interactions between the drugs and complexing agent βCD.

The DSC spectrum of Atorvastatin calcium with HP-βCD formulated by kneading by physical mixture. The formulations of, AF₄ and AF₁₀ has shown the peaks which is endothermic in nature. This is because of shift of characteristics peaks of drugs with complexing agents, indicated a strong interactions between the drugs and complexing agent HP-βCD. The formulation AF₁₆, formulated by spray drying technique has shown very broad endothermic peaks. This is because of shift of characteristics peaks of drug with complexing agents, indicated a very strong interactions between the drug and complexing agent HP-βCD.

**SEM Study of Atorvastatin Calcium inclusion complexes:**

The SEM study is to assess the microscopic aspects of drug Atorvastatin calcium, polymers like β-CD and HP-βCD and its complexes. This method was use to know the existence of a single component in the preparation of drug complexations. The Pure drug of Atorvastatin calcium was characterizes by the presence of regular sized crystalline particles. The SEM photos formulations AF₁₆, of spray dried inclusion complexes shows the characteristic morphological nature of the preparation, generally formed in this technique that are smaller sized particle tends to aggregated with each other, indicates the exists of an amorphous nature product with the one components in the complexation thus suggests the maximum complexations.
So, this inclusion complex (AF\(_{16}\)) was used to formulate the fast dissolving tablets by direct compressions method. Crosspovidone, croscarmellose, sodium starch glycolate, were used as superdisintegrating agents. The formulation prepared drug with crosspovidone formulations of Atorvastatin Calcium showed good evaluation parameters, compare with others superdisintegrating agents. To comparing with Atorvastatin Calcium was showed good release.

**Evaluation of FDT tablets**

**Precompression parameters:**
The formulated fast dissolving tablets were evaluated for the following parameters Flow properties like,

- Angle of repose.
- Loose bulk density.
- Tapped density.
- % Carr"s Index.

The above all parameters of formulations Ap1 to Ap9, which showed good flow properties.

**Evaluation of Precompression parameter:**

**Angles of repose:**
The angles of repose values (Ap1 to Ap9) of all the formulations for Atorvastatin calcium were found to be in the range, which indicated a better flow property of the powders.

**Tapped density Bulk density:**
The values of all formulations (Ap1 to Ap9) for Atorvastatin calcium lies between the acceptable ranges. These results help to calculate the % of the powder compressibility and which is within the acceptable limits.

**Percent of compressibility:**
The % compressibility of (Ap1 to Ap9) all the formulations for Atorvastatin calcium lies within the range. That indicted formulations are showing good compressibility.
Post-compression parameters of Atorvastatin calcium:
Formulations (Ap1 to Ap9) of all the formulations for Atorvastatin calcium were subjected to evaluations of different official specification.

Shape and colour of tablets:
Atorvastatin calcium tablet formulations were randomly picked and evaluated its shape and colour, all batches showed white, circular, flat and scored on one side.

Uniformity of thickness:
The values (Ap1 to Ap9) of the formulations for Atorvastatin calcium are almost uniform in thickness.

Hardness test:
The tablets hardness for formulations (Ap1 to Ap9) of Atorvastatin calcium was found to be within the range. The hardness of all the formulations was shown the sufficient hardness and almost uniform possess good mechanical strength.

Friability test:
The results of Atorvastatin calcium tablets were found within the approved range (<1%) and all the formulations (Ap1 to Ap9) possesses good mechanical strength.

Weights variations test:
The % of weight variation of Atorvastatin calcium (Ap1 to Ap9) of all the formulation was found to be within the acceptable limit (± 7.5%).

Drug contents uniformity:
The contents uniformity of formulations (Ap1 to Ap9) of Atorvastatin calcium was found to be within the acceptable range.

Wetting time:
The formulation (Ap1 to Ap9) of Atorvastatin calcium showed quick wetting time within the acceptable range. These results were obtained due to the ability of capacity
of absorption of water and swelling. The all superdisintegrand have a better water absorption capacity and cause the swelling.

**Water absorptions ratio:**

Water absorptions ratio of formulations (Ap1 to Ap9) of Atorvastatin calcium were shown the results which is within the acceptable range. Water absorption ratio of Atorvastatin calcium fast dissolving tablets formulations concentration of the superdisintegrand increases with increase from 5 to 1 %. More the superdisintegrand concentration greater was the water uptake and therefore increases in water absorptions ratio.

**Disintegration time:**

All the formulations of (Ap1 to Ap9) of Atorvastatin calcium were shown, the disintegration time less than 68-70seconds. Crospovidone showed less disintegrating time compared with the Crosscarmellose and sodium starch glycolate. In case of the Crospovidone super disintegrating agent, increasing the disintegration time because of high gelling"s tendency of superdisintegrandants. The Crospovidone which causes swellings of tablets mass with subsequent retardation of the disintegration.

**Dispersion time:**

The rapid dispersion of the tablets was observed in all the formulations (Ap1 to Ap9) of Atorvastatin calcium. This indicated that the efficiency of superdisintegrandants was in the orders Crosspovidone > Crosscarmellose > Sodium Starch Glycolate. This parameter gives the superdisintegrating agents information regarding its nature in of the formulation. The in vitro dispersion time was measure by observing the time taken by the fast dissolving tablets to undergo uniformity in the dispersion in 6.8 pH buffer.

**In vitro disso studies:**

The results which are got in the *in vitro* drug releases for (Ap1 to Ap9) of Atorvastatin calcium the formulation formulated by direct compressions technique. Here in all batch of (Ap1 to Ap9) the disso rates were obtained to be increases linearly
with increasing superdisintegrants concentrations. The Ap8 showed good drug release profile and these two drug release were highest drug release compared to all formulations at the ends of 12 min. The markedly enhancement in disso rates of formulation Ap8 formulated by direct compression technique with 15% of Crosspovidone compared with the 15% of Croscarmellose and Sodium Starch Glycolate superdisintegrants. By the dissolution data of formulations (Ap1 to Ap9) it was concluded that the formulation of Ap8 prepared with Crosspovidone superdisintegrant was showed the highest drug release, compared with the crosscarmellose and sodium starch glycolate.

**Curve fitting analysis:**
All formulation (Ap1 to Ap9) found to followed Higuch, rate of release, this may be diffusion.

**Stability studies:**
The stability study were carried out for the formulations of Ap8 stored at the following temperature and humidity conditions such as, 25\(^\circ\)C/60% RH and 40\(^\circ\)C/75% RH for 30 days. The various parameters were evaluated such as, hardness, friability, drug contents uniformity, *in vitro* disintegrations, wetting time were analyzed at a different time of interval such as, 10, 20 and till a periods of 30 day. There was not much variations observed in any parameters throughout study period of time.

**The drug dissolution study of formulation Ap8:**
The drug dissolution study of formulation Ap8 was carried out. The formulation Ap8 showed the 75.54 % drug release.

**Post compressions parameter:**
The shape and colours of all formulations were found to be white in colour, circular fast dissolving tablets and score on one side. The thickness of the fast dissolving tablets was found uniforms in friability and hardness values of all the prepared formulations (Ap1 to Ap9). Tablets formulated by direct compression method were within the limits and found to be mechanically stable formulations. The drug content uniformity and % weight variation out for all the eighteen formulations were found to be within the acceptable limits. The Ap1 to Ap9 formulation batches of tablets, parameters such as, *in vitro*
disintegration, dispersion and wetting time were found to be faster compared with the formulation Ap1 to Ap9. The water absorption ratio showed good absorptivity for all the formulations. The in vitro disso results was showed that maximum cumulative % drug release more in the formulation Ap8 showed more release, compared to the Ap1 to Ap9. Kinetics of release profiles for five different models such as, zero order, first order, Higuchi Matrix, Peppas and Hixson-Crowell equation kinetics. Kinetics of release profiles for five different models indicated that the more formulations followed the best Higuchi models of Ap1 to Ap9, formulations.

The stability studies were conducted formulations of Ap8 stored at the following temperature and humidity conditions such as, 25°C/60% RH and 40°C/75% RH for 30 days. The various parameters were evaluated such as, hardness, friability, drug contents uniformity, in vitro disintegrations, wetting time were analyzed at a different time of interval such as, 10, 20 and till a periods of 30 day. There was not much variation observed in any parameters throughout the study period of time. The best selected formulations such as, Ap8 was found to be stable.