1. **Literature Review**

- J. Kausalya et al (2011) developed Solubility and Dissolution Enhancement Profile of Telmisartan using various Techniques to improve the aqueous solubility and dissolution rate of the telmisartan solid dispersions of drug using different methods were prepared and investigated. Enhancement of solubility of Telmisartan was observed with solid dispersion of drug using carriers such as Poly vinyl pyrrolidone-k30, Poly ethylene glycol-4000 and βeta -Cyclodextrin. The observed results showed the solid dispersion of drug almost three times greater than the pure drug.

- Naveen Chella et al (2014) developed Preparation and Characterization of Liquisolid Compacts for Improved Dissolution of Telmisartan by using Transcutol HP as vehicle, Avicel PH102 as carrier, and Aerosil 200 as a coating material. The formulations were evaluated for drug excipient interactions, change in crystallinity of drug, flow properties, and general quality control tests of tablets using Fourier transform infrared (FTIR) spectroscopy, differential scanning calorimetry (DSC), X-ray diffraction (XRD), angle of repose, and various pharmacopoeia Itests. In vitro dissolution studies were performed at three pH conditions (1.2, 4.5, and 7.4). Stability studies were performed at 40°C and 75% RH for three months. The formulation was found to comply with Indian pharmacopoeial limits for tablets. FTIR studies confirmed no interaction between drug and excipients. XRD and DSC studies indicate change/reduction in crystallinity of drug. Dissolution media were selected based on the solubility studies. The optimized formulation showed pH independent release profile with significant improvement ($P < 0.005$) in dissolution compared to plain drug and conventional marketed formulation. No significant difference was seen in the tablet properties, and drug release profile after storage for 3 months.

- Y Sirisha et al (2013) prepared Formulation and Evaluation of Solubility enhanced Fast Disintegrating Tablets of Telmisartan using natural Super disintegrants, by 6 inclusion complexes were prepared by both physical mixing and kneading methods in 1:1, 1:2 and 1:3 molar ratios of telmisartan and β-cyclodextrin. The complexes were tested for drug content and in-vitro drug release studies. Based on these parameters formulation KM3 was selected as best one for further studies as % drug content was 98.47% and in-vitro drug release was 76.99% in 45min. The tablets were formulated for the inclusion complex KM 3 using two natural super disintegrants gum karaya and soy polysaccharides in three concentrations and were evaluated for % weight variation, hardness and disintegration time and in-vitro
drug release studies. The % weight variation range was found to be between 508±0.57 to 524±0.34, the hardness range was found to be between 3.4 ± 0.29 to 4.2 ± 0.18 kg/cm², the disintegration time ranges between 5min 20sec to 7min 25sec, in - vitro drug release shows that as concentration of super disintegrant increases rate of drug release increases. Among all the formulations, F3 shows best result with a disintegration time of 5min 30sec and drug release up to 92.555% in 45min.

- Bhagwat Durgacharan A et al (2012) Development of Solid Self Micro Emulsifying Drug Delivery System with Neusilin US2 for Enhanced Dissolution Rate of Telmisartan to develop solid self micro emulsifying drug delivery system (S-SMEDDS) with Neusilin US2 for enhancement of dissolution rate of Telmisartan (TEL). SMEDDS was prepared using Oleic acid, Tween 80 and PEG 400 as oil, surfactant and co-surfactant respectively. For formulation of stable SMEDDS, micro emulsion region was identified by constructing pseudo ternary phase diagram containing different proportion of surfactant: co-surfactant (Km value 1:1, 2:1 and 3:1), oil and water. Prepared SMEDDS was evaluated for thermodynamic stability study, dispersibility tests, globule size and zeta potential. S-SMEDDS was prepared by adsorption technique using Neusilin US2 as solid carrier. Prepared S-SMEDDS was evaluated for flow properties, drug content, reconstitution properties, FTIR, SEM, DSC and in-vitro dissolution study. Results showed that prepared liquid SMEDDS passed dispersibility test with good thermodynamic stability. Globule size was found to be 30.2 nm with polydispersity index 0.116 and -5.80 mV zeta potential. S-SMEDDS showed good flow property and drug content. Reconstitution properties of S-SMEDDS showed spontaneous micro emulsification with globule size 32.4 nm and polydispersity index 0.219 and -6.32 mV zeta potential. Results of in-vitro dissolution showed that there was enhancement of dissolution rate of TEL as compared with that of plain TEL. From the results study concluded that, Neusilin US2 can be used to develop S-SMEDDS by adsorption technique to enhance dissolution rate of poorly water soluble drug such as TEL.

- Ananda Chaudhary et al (2014) prepared Formulation Design and Optimization of Mouth Dissolving Tablets of Telmisartan using Solid Dispersion Technique is a crucial aspect in the formulation of mouth dissolving tablets is to mask the bitter taste and to minimize the disintegration time while maintaining a good mechanical strength of the tablet. Solid dispersion was prepared to increase the solubility and dissolution rate of Telmisartan with Poloxamer 188 (PXM188) by using fusion method. Drug polymer interactions were investigated using differential scanning calorimetry (DSC), x-ray diffraction (XRD)
and Fourier transform infrared spectroscopy (FTIR). For the preparation of Telmisartan mouth dissolving tablets, its 1:3 solid dispersions with PXM188 was used with various synthetic superdisintegrants (Croscarmellose sodium, SSG). In an attempt to construct a statistical model for the prediction of wetting time, disintegration time and percentage friability, a 32 full factorial design was used to optimize the influence of the amounts of superdisintegrants. The results indicate that the optimized tablet formulation provides a DT 45 sec, WT 65 sec, cumulative percentage drug release 96.23% and acceptable friability (0.82%). Stability studies of optimized formulation revealed that formulation is stable.

- M. N. Karemore et al (2012) Formulation and Evaluation of Fast Dissolving Tablet of Anti hypertensive drug prepared by direct compression technique with β-cyclodextrin complexes using various superdisintegrants like croscarmellose sodium, crospovidone and sodium starch glycolate. Telmisartan is an angiotensin II receptor antagonist used in the management of hypertension. The rate of absorption and/or the extent of bioavailability for such a poorly soluble drug is controlled by rate of dissolution. Hence to enhance the solubility of drug a complex of Telmisartan was prepared with β-cyclodextrin and this complex was compressed into tablets. The prepared tablet were evaluated for weight variation, thickness, friability, hardness, assay, disintegration time, wetting time, water absorption ratio, in vitro dissolution studies, stability study and IR spectroscopy. Different formulation showed disintegration time between the range of 20 to 45 sec. Among all the formulations, formulation F1 prepared with croscarmellose sodium (5%) showed 98.64% drug release within 7 min. Thus, formulation F1 was considered as the best among the other formulations. No chemical interaction between the drug and the excipients was confirmed by FTIR studies. The stability study was conducted and the formulations were found to be stable. These results revealed that fast dissolving tablets of poorly soluble drug Telmisartan showed enhanced dissolution and hence better patient compliance.

- Durga charan Arun Bhagwat et al (2012) prepared Formulation and evaluation of solid self micro emulsifying drug delivery system using aerosil 200 as solid carrier to develop S-SMEDDS of poorly water soluble drug Telmisartan (TEL) using Aerosil 200 as solid carrier. Liquid SMEDDS was prepared using Acrysol EL 135, Tween 80 and PEG 400 as oil, surfactant and co-surfactant and was converted to S-SMEDDS by adsorbing it on Aerosil 200. Prepared S-SMEDDS was evaluated for flow properties, drug content, reconstitution properties, DSC, SEM, invitro drug release and ex-vivo intestinal
permeability study. Results showed that prepared S-SMEDDS have good flow property with 99.45 ± 0.02 % drug content. Dilution study by visual observation showed that there was spontaneous micro emulsification and no sign of phase separation. Droplet size was found to be 0.34 μm with polydispersity index of 0.25. DSC thermogram showed that crystallization of TEL was inhibited. SEM photograph showed smooth surface of S-SMEDDS with less aggregation. Drug releases from S-SMEDDS were found to be significantly higher as compared with that of plain TEL. Ex-vivo intestinal permeability study revealed that diffusion of drug was significantly higher from S-SMEDDS than that of suspension of plain TEL. Study concluded that S-SMEDDS can effectively formulated by adsorption technique with enhanced dissolution rate and concomitantly bioavailability.

- S.Ashutoshkumar et al (2012) developed Design and Evaluation of Sustained Release Tablet of Telmisartan, In the present study an attempt has been made to prepare Fast Dissolving tablets of Telmisartan by using Superdisintegrants–Crosspovidone, Ac-de-sol, and sodium starch glycolate, level of addition to increase the rate of drug release from dosage form to increase the dissolution rate and hence its bioavailability. The tablets were prepared by Direct Compression methods and the prepared blend and tablets were evaluated for their physicochemical properties and In-Vitro dissolution study. The evaluation studies were performed such as Weight Variation, Thickness, Hardness, Disintegrating Time, Wetting Time, and In-Vitro Drug Release and Stability Study. The Disintegration time of Fast Dissolving tablets were increased by the addition of concentration of Superdisintegrants.

- GR. Girish Reddy et al (2012) developed Design and Evaluation of Sustained Release Capsule of Telmisartan by Using Super disintegrants Crosspovidone, Ac-de-sol, and sodium starch glycolate, level of addition to increase the rate of drug release from dosage form to increase the dissolution rate and hence its bioavailability. The capsules were prepared by Dissolution methods and the prepared blend and capsules were evaluated for their physicochemical properties and In-Vitro dissolution study. The evaluation studies were performed such as Weight Variation, Thickness, Disintegrating Time, and In-Vitro Drug Release and Stability Study. The Disintegration time of Dissolving Capsules were increased by the addition of concentration of Superdisintegrants.
T.E.G.K Murthy et al (2011) Studied on Dissolution Rate Enhancement of Telmisartan with Hydroxy propyl β Cyclodextrin Complexes is to improve the solubility of telmisartan by forming complexation with HP- β CD by using three convenient methods viz physical mixing method, kneading method, and solvent evaporation method at different molar ratios of 1:1, 1:2 and 1:3. In vitro dissolution studies were carried out in 7.5 pH phosphate buffer. The cyclodextrin complexes formulated by employing 1:3 (drug: complexing agent) with kneading technique showed higher drug release compared to other techniques and other ratios. Significance difference was observed in IR spectra of pure drug and complex containing telmisartan so it conform the formation of complex. In X-RD the pure drug was observed in crystalline form after complexing with HP- β CD it was observed in amorphous form.

Rakesh Singh et al (2012) designed Development Characterization & Stabilization of Poorly Water Soluble Drugs utilizing Dispersion Techniques by using Telmisartan β-CD & PEG - 6000. A phase solubility method was used to evaluate phosphate buffer PH 7.4 & SLS 0.2%. solid dispersions were prepared by the method of physical kneading solvent & Fusion method were performed for solid dispersions of telmisartan at different molar ratios of 1:1,Infrared (IR) spectroscopy, The β-CD & PEG-6000 complexes formulated by employing 1:1 (drug: complexing agent) with kneading technique showed higher drug release.

Jaiprakash et al (2013) designed Enhancement of solubility and dissolution rate of telmisartan by spray drying technique was to improve the solubility and therefore the rate of dissolution of telmisartan in pH 1.2, 4.5 and 7.5(FDA recommended) buffers as the dissolution media using spray drying technique. Nanodispersion of telmisartan was prepared by using various proportion of drug: PVP-K30 ratios (1:1 to 1:4). The prepared nanodispersion was subjected to in-vitro dissolution, particle size distribution,FTIR spectroscopy, and PXRD, DSC and SEM studies. The results indicated that formulation containing drug:PVP - K30 ratio of 1:4, prepared by spray drying technique showed the cumulative release of 99.84% as compared to 9.36% for the pure drug in pH 7.5 phosphate buffers and also significant improvement in pH 1.2, 4.5 and water. Particle size analysis reveals that telmisartan was dispersed in the form of nanoparticles with size 2.5-6.5 r nm in PVP matrix.Absence of significant drug-carrier interaction was confirmed by FTIR and DSC data. XPRD reveals that crystallinity nature of drug was decreased.In conclusion, the prepared nanodispersion telmisartan with PVP K30 in ratio of 1:4 was shown higher release profile which may contribute to improved bioavailability of telmisartan.
• Vatsal A et al (2012) Optimization and Evaluation of a Formulation Containing Low Soluble Antihypertensive Agent by preparing Six batches of immediate release tablet were developed and among them F6 showed satisfactory physicochemical characteristics and drug content uniformity and release of a drug within 60 minutes with maximum release of 99.1% which is comparable to reference product.

• A. Dubey et al (2014) prepared Enhancement of Aqueous Solubility and Dissolution of Telmisartan Using Solid Dispersion Techniques of telmisartan were prepared by using poly ethylene glycol 4000 and mannitol as hydrophilic carriers in different weight ratios by solvent evaporation method. The drug and the solid dispersions were characterized by saturation solubility studies, in-vitro dissolution study, Fourier - transform infrared spectroscopy, differential scanning calorimetry, drug content estimation and stability study. Based on physical characters and drug release pattern, formulation F2 (1 g drug, 4 g PEG 4000 and 1 g mannitol) exhibited the best results. The carriers, polyethylene glycol 4000 and mannitol were found to be effective in increasing the aqueous solubility and dissolution rate of telmisartan in solid dispersions when compared to the pure drug.

• Mays A et al (2014) designed Dissolution Enhancement of Telmisartan by Liquisolid Compact tablets were prepared using propylene glycol, Avicel PH 102, Aerosil 200 and indion 414 as non-volatile solvent, carrier, coating and superdisintegrant respectively. Telmisartan was formulated in form of liquisolid compacts in different concentration of drug in non-volatile vehicle: 20% w/w, 30% w/w and 40% w/w with different excipients ratio (R): 10:1, 15:1, and 20:1 and the effect of these two variables on the invitro dissolution characteristics at two different dissolution media (HCl pH 1.2 and phosphate buffer pH 6.8) was studied and the release behavior was compared with that of the marketed tablet. Before compression, the prepared liquisolid powders were evaluated for their flow properties by measuring angle of repose, Carr’s compressibility index and Hausner’s ratio and also were evaluated for post compression parameters such as hardness, friability, drug content uniformity, disintegration time and dissolution test. Fourier transform infrared (FTIR) analysis, differential scanning calorimetry (DSC), X-ray powder diffraction (XRPD) and scanning electron microscopy (SEM) were performed. Results: The results showed that liquisolid formulas exhibited acceptable flowability and compressibility and
markedly higher percentage of drug release than of the marketed tablet and it was found that excipients were compatible with the drug in the prepared liquisolid system that was determined by fourier transform infrared spectroscopy and differential scanning calorimetry. The X-ray diffraction and the scanning electron microscopy showed conversion of drug from crystalline to amorphous (solubilized) form that lead to increase the dissolution rate. Conclusion: From this study it was concluded that the liquisolid technique is an effective approach to enhance the dissolution rate of telmisartan.

- Niranjan Ch et al (2013) developed Improvement of Bioavailability and Solubility of Telmisartan by Solid Dispersion Technique using Various Carriers and solid dispersions were prepared by physical mixture method using PEG 6000, Eudragit L 100 and PVP K 30 as a carrier in various ratios. Optimized solid dispersion was evaluated for % CDR and Time for CDR, FTIR, DSC, SEM and in vitro drug release study. The results showed that among the various batches containing the polymer being used in the study, F2 formulation containing DRUG: EUD L 100 in the ratio 1:1 exhibited significant enhancement in solubility and dissolution profile of the drug. The results were supported by the DSC, FTIR, SEM and stability studies.

- Sailaja Gunnam et al (2015) Formulation and Evaluation of Liquisolid Compacts of Telmisartan. Liquisolid compacts were prepared using Polyethylene glycol 400 as non-volatile solvent, Avicel PH102 as carrier, and Aerosil 200 as the coating material. Telmisartan was formulated as liquisolid compacts in different concentrations of drug in non-volatile vehicle (15% w/w, 20% w/w, 40% w/w, 60% w/w and 80% w/w) with different excipient ratios (R) (5:1, 10:1, and 20:1) were studied and the release behavior was compared with that of the marketed tablet (Telmikind-40). The prepared liquisolid powders were evaluated for the flow properties like angle of repose, Carr’s compressibility index and Hausner’s ratio. The formulated liquisolid compacts were mixed with a superdisintegrant (sodium starch glycolate) and compressed into tablets (F1-F15) and were evaluated for various post compression parameters such as hardness, friability, content uniformity, disintegration time and dissolution test. The formulated liquisolid compacts exhibited acceptable flowability, compressibility and markedly given improved percentage of drug release (87.9 %). Among all of the formulated tablets (F1-F15), telmisartan F-9 formulation exhibited enhanced dissolution rates when compared to the directly compressed telmisartan formulation (Telmikind-40) owing to increased wetting properties and enhanced surface exposure of drug moiety for dissolution. FTIR study revealed that there is no drug excipient
interaction. From this study it was concluded that the liquisolid technique is an effective approach to enhance the dissolution rate of telmisartan.