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Formulation and evaluation fast dissolving tablets of lovastatin using solid dispersion method

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ABSTRACT

The research worked based using solid dispersion method though poorly soluble drugs lovastatin formulating it as solid dispersions subsequent preparation of fast dissolving tablets with the prepared solid dispersions using different concentrations of super disintegrates and comparing them with that of the marketed product. Lovastatin is a HMG CoA reductase inhibitor used in the treatment of hyperlipidemias and prevention of ischemic heart disease. It is practically insoluble in water, sparingly soluble in alcohol and soluble in acetone. In the present investigation lovastatin and solid dispersion were prepared by physical mixing, fusion, solvent evaporation and lyophilizafio n methods using polyethylene glycol-6000 as an inert amphiphilc carrier. The prepared solid dispersions were evaluated for pre compressional parameters such as angle of repose, Carr's index, particle size and drug content.

Keywords: solid dispersion, poorly soluble drugs, super disintegrates.

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INTRODUCTION

Solid dispersion method of dispersion of active ingredient in an inert carrier or matrix at solid state has prepared by the melting (fusion), solvent or the melting solvent method. Solid products consists of at least two different components, generally a hydrophilic matrix and a hydrophobic drugs. The matrix may be crystalline or amorphous. The drag can be dispersed molecularly, in amorphous particles (clusters) or in crystalline particles[1, 2].

Solid dispersions are of six types based on the molecular arrangement.

1. Simple eutectic mixtures

2. Amorphous precipitation in crystalline matrix

3. Solid solutions

- Continuous solid solutions
- Discontinuous solid solutions
- Substitution solid solutions
- Interstitial solid solutions

4. Glass suspension

5. Glass solution

6. Complex formation between the drug and carrier

MATERIAL AND METHOD

Lovastatin given to gift sample of Zeiss pharmaceutical Badhi(H.P), pregelatinised starch, sodium starch glyeolate, crose armellose sodium , polyethylene glycol 6000 and crospovidone etc.

Saturated Solubility Studies of Lovastatin

Saturated solubility of lovastatin was performed in different dissolution media. 500mg of lovastatin was weighed and transferred into different conical flasks. 50ml of different dissolution media were transferred into individual conical flasks and were closed appropriately. All the conical flasks were placed in the REMI incubator shaker. The shaker was allowed to operate at 50 rpm at 37° C ± 1° C for 24 hrs. Then the conical flasks were removed from the incubator shaker and the samples were filtered by using what man filter paper. The clear solution obtained by filtration was suitably diluted with appropriate dissolution media and the absorbance values were noted at 238 nm by using corresponding dissolution media as blank solutions.

The methods employed for the preparation of solid dispersions are:

1. Physical mixing.

2. Fusion method

3. Solvent evaporation

4. Lyophilization

Physical Mixing:

Specified quantity of drug and polyethylene glycol 6000 were weighed separately and passed separately through sieve no 80. The materials passed through sieve no.80 were collected and transferred into a clean and dry glass mortar. Drug and PEG- 6000 were triturated together and again screened through sieve no 100. The mixture passed through sieve no 100 was collected and packed in a wide mouthed amber coloured glass container and was hermetically sealed. Then the mixture was stored at ambient conditions.

Fusion Method:

Specified quantity of PEG-6000 was taken in a china dish and it was heated at on a mantle until molten mass was formed. To the molten mass specified quantity of drug was added and triturated vigorously at room temperature. The mixture obtained was triturated thoroughly in a glass mortar and screened through sieve no. 100. Then the mixture was collected, packed in a wide mouthed amber coloured glass container and was hermetically sealed. Then the mixture was stored at ambient conditions.

Solvent Evaporation:

Specified quantity of drug was taken in a china dish and it was dissolved in few ml of methanol. To the methanolic solution, specified amount of PEG-6000 was added and the solvent was evaporated under vacuum using Rota flash evaporator. The mixture obtained was triturated thoroughly in a glass mortar and screened through sieve no. 100. Then the mixture was collected, packed in a wide mouthed amber coloured glass container and was hermetically sealed. Then the mixture was stored at ambient conditions.

Lyophilization:

Specified quantity of drug and PEG-6000 were weighed added with minimum amount of water. This dispersion was rapidly solidified by freezing in the IL Shin freeze drier (Shin Lab Co., Ltd). The solvent in the dispersion was sublimed under a pressure of 10 M tore and condensed onto a -40°C condenser. After the solvent was completely removed, the powder residue appeared as a porous, light and puffy mass. The lyophilized preparations were stored in a desiccator at room temperature. The compositions of various solid dispersions were given.

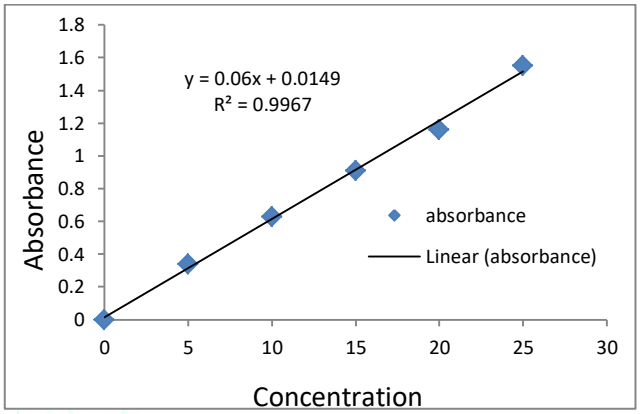
Drug Release Studies Solid Dispersions of Lovastatin Solid Dispersions:

Dissolution studies on solid dispersions were performed in a calibrated eight stage dissolution rate test apparatus equipped with paddles employing 900 ml of 7.0 pH phosphate buffer as a medium. The paddles were operated at 50 rpm and the temperature was maintained at 37±0.5°C throughout the experiment. Samples were withdrawn at 5, 10, 15, 20, 30, 45, 60 minutes and replaced with equal volume to maintain the constant volume of dissolution medium throughout the experiment. Drug content of the samples was determined by double beam UV spectrophotometer at 238 nm after suitable dilutions of the samples.

Absorbance data for calibration curve of Lovastatin at 238 nm

Concentration	Absoption
2	0.476
4	0.678
6	0.690
8	0.710
10	0.890

Calibration Curve for the Estimation of Lovastatin



Differential Scanning Calorimetry (DSC):

A differential scanning calorimeter (DSC 60, Shimadzu) was used to obtain the DSC curves of solid dispersions prepared by fusion, solvent evaporation and lyophilization methods representing the rate of heat uptake. About 10 mg of sample was weighed in a standard open al pans, and scanned from 20-300°C, at a heating rate of 10°C/minute while being purged with dry nitrogen.

RESULT

The lovastatin solid dispersions which shows better dissolution rate were then formulated as fast dissolving tablets by using newer super disintegrates such as pregelatinised starch, sodium starch glyeolate, crose armellose sodium, crospovidone. All the tablet formulations were evaluated for physical parameters such as weight uniformity, hardness, friability, wetting time, dispersion time and drug content as per the IP specifications. the solid dispersions prepared by various methods ,The angle of repose values obtained for various solid dispersions were in the range of 19.56° to 24.28° which indicated the good flow properties of dispersions, The Carr's index values obtained for various solid dispersions were in the range of 14.17 to 15.52% which indicated the good flow properties of dispersions. The preparation of fast dissolving tablets by using newer super disintegrants.

CONCLUSION

present search preparation of solid dispersions by physical mixing, fusion, solvent evaporation and lyophilization methods greatly improved the solubility and dissolution rate of poorly soluble drugs, lovastastin and PEG 6000 used as an inert amphilic carrier was found suitable for the preparation of solid dispersions by various methods. It was observed that the order of increased dissolution rate for various solid dispersions prepared by different methods were lyophilization > solvent evaporation > physical.

REFERENCES

1. Maheshwari R., & Dahima R. SOLID AS SOLVENT: NOVEL SPECTROPHOTOMETRIC ANALYTICAL TECHNIQUE FOR QUANTITATIVE ESTIMATION OF TINIDAZOLE IN TABLETS USING SOLIDS (EUTECTIC LIQUID OF PHENOL AND LIGNOCAINE HYDROCHLORIDE) AS SOLUBILIZING AGENTS (MIXED SOLVENCY CONCEPT). Journal of Drug Delivery and Therapeutics, 2017; 7(3):127-130.
2. Agrawal R, & Maheshwari R, Novel application of mixed solvency concept in the development of oral liquisolid system of a poorly soluble drug, cefixime and its evaluation. Journal of Drug Delivery and Therapeutics, 2018; 8(6-s):5-8.
3. Padiyar A, Maheshwari R, Novel Dry Injection for Reconstitution of Aspirin Using Solid Solubilisers. Journal of Drug Delivery and Therapeutics, 2017; 7(7):44-45.
4. RK, Padiyar A, Putliwala M ; Utilization Of Mixed-Solvency Technique In Spectrophotometric Analysis Of Cefixime Trihydrate Tablets. International Journal of Pharmaceutical Research & Analysis, 2015; 1(1)-3
5. Venkata S, Dinesh Kumar P; Enhancement of Solubility of Poorly Soluble Drugs by Using Solid Dispersion Technique International Journal of Pharma And Chemical Research, 2015; 11(1):1
6. Reddy T A, Srinivasan S, Kavitha K, Kumar R; Review on: better solubility enhancement of poorly water soluble drugs. International Journal of Inventions in Pharmaceutical Sciences, 2013; 1(4): 67.
7. Bindu Madhavi. Kusum B, Ramalingam R, Ravinder Nath A, Zulkar Nain K, Arjun G and David B., Preparation, characterization, and tableting of a solid dispersion of Simvastatin with super disintegrants, Journal of Pharmacy Research., 2010; 3:2568-2570.