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NOTE

Dissolution Enhancement of Aceclofenac Drug by Means of Solid Dispersion Technique

T. AYYAPPAN*, T. VETRICHELVAN and S. DARLIN QUINE†
Department of Pharmaceutics, Adhiparasakthi College of Pharmacy
Melmaruvathur-603 319, India
Tel: (91)(44)27529093: E-mail: tayyaps@yahoo.co.in

Aceclofenac is a phenyl acetic acid derivative used in the treatment of pain and inflammation in rheumatoid arthritis, osteoarthritis and ankylosing spondylitis. Aceclofenac is practically insoluble in water. Hence bioavailability is dissolution rate limited. Therefore, solid dispersions of aceclofenac with polyvinyl pyrollidone (PVP K30) were prepared to increase its dissolution rate. Solid dispersions of aceclofenac were prepared using polyvinyl pyrollidone (PVP K30) as water soluble carrier (1:1, 1:2 and 1:3 by weight ratio) employing solvent evaporation method. Dissolution study were carried out using 2 % w/v sodium laurayl sulphate in water as a dissolution medium. Aceclofenac was released at a much higher rate from solid dispersions containing polyvinyl pyrollidone (PVP K30) and physical mixture as compared to that of pure drug powder. Faster dissolution rate was observed in 1:1 drug: carrier ratio. The increase in dissolution rate of the drug may be due to increase wettability, the hydrophilic nature of carrier also possible due to the reduction in drug crystallinity.

Key Words: Aceclofenac, Dissolution, PVP-K30.

Aceclofenac is a phenyl acetic acid derivative used in the treatment of pain and inflammation in rheumatoid arthritis, osteoarthritis and ankylosing spondylitis chemically it is [2-(2,6-dichlorophenyl)amino) benzene acetic acid carboxymethylester[1]. It is a new drug and finds place in Martindale-extra pharmacopoeia[2]. Aceclofenac is practically insoluble in water. Hence the present work was aimed to increase rate of dissolution of aceclofenac and to minimize the erratic dissolution profile of the drug. Dissolution of drug can be increased by variety of contemporary approaches like solid dispersions, complexation and by the use of hydrophilic carrier. Solid dispersion can be prepared by various methods such as solvent evaporation and melting method[3,4]. In the present investigation, solvent evaporation method was employed for the preparation of aceclofenac solid dispersions.

†School of Chemical and Biotechnology, Sastra Deemed University, Thanjavur, India.

Attempts were made in the present investigation to enhance the dissolution rate of aceclofenac using hydrophilic carrier like polyvinyl pyrollidone (PVP K 30).

Preparation of solid dispersion of aceclofenac by solvent evaporation method: Accurately weighed aceclofenac and the carrier like PVP K 30 (1:1, 1:2 and 1:3 ratio) was dissolved in specified quantity of methanol. The solvent was evaporated at 60 °C for 2 h in a hot air oven. The solid dispersion was stored for 24 h in a dessicator containing fused calcium chloride as a dessicating agent. The resultant solid was pulverized and then sieved through 120#. The powder equivalent to 100 mg aceclofenac was weighed and lactose was mixed uniformly to obtain quantity equivalent to 500 mg. It was filled in empty hard gelatin capsule (size 00) by hand filling method.

Preparation of physical mixture: Weighed amount of aceclofenac and PVP K 30 were mixed in a glass mortar for 5 min in the ratio like 1:1, 1:2 and 1:3. Powder equivalent to 100 mg aceclofenac was weighed and lactose was mixed uniformly to obtain quantity equivalent to 500 mg. It was filled in empty hard gelatin capsule (size 00) by hand filling method.

***in vitro* Dissolution study:** The dissolution study[5] of solid dispersion and physical mixture of aceclofenac capsule was conducted in 900 mL of 2 % (w/v) sodium lauryl sulphate in water using type I (basket type) dissolution test apparatus USP XXIII the temperature of dissolution medium was maintained at 37 ± 0.5 °C and stirring speed was kept 50 rpm (Fig. 1). 5 mL of the sample was withdrawn at the time interval of 0.25, 0.50, 1.0, 1.5 and 2.0 h and filtered through Whatmann filter 40. The volume of dissolution medium was adjusted by replacing 5 mL of dissolution medium after each sampling. The samples were suitably diluted and absorbance was measured at 275 nm.

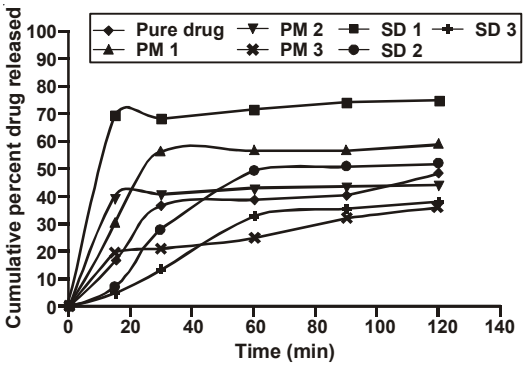

Fig. 1. Comparatrive dissolution profiles of aceclofenac solid dispersion system in 2 % w/v sodium lauryl sulphate in water

The dissolution rate of pure aceclofenac was poor and during 2 h a maximum of about 48.20 % of the drug was released. The reasons for the poor dissolution of pure drug could be poor wettability and/or agglomeration of particles. Results shown the comparative release profile of various solid dispersion of aceclofenac with PVP K 30 having different weight ratio such as 1, 2 and 3 for one part of aceclofenac, physical mixture and pure drug. From release profile it can be seen that dissolution of aceclofenac increases within 1:1 ratio of drug: PVP K 30. This may be attributed to increase in drug wettability, solubilization of the drug due to hydrophilic carrier. After this ratio the dissolution rate was decreased, this decrease in dissolution may be due to increased viscosity. It can be concluded that the drug release from the physical mixture is greater than that of pure drug and is slower than that of solid dispersions. From the results, it may be concluded that the dissolution rate of aceclofenac can be increased by preparing the solid dispersion with PVP K 30.

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