**ABSTRACT**

The aim of this work was to study the importance of porous osmotic pump tablets over the matrix tablets for controlled delivery of Diclofenac sodium (DS). Thesolubility of DS is highly pH dependent. The matrix tablets (MT) were prepared bydirect compression method. The porous osmotic pump tablets (CPOP) were designedusing D-Optimal design. The formulation contains potassium chloride as osmotic agent, cellulose acetate as semipermeable membrane, poly ethylene glycol (PEG400) as pore former and sodium lauryl sulphate (SLS) as solubility enhancer. All formulations were evaluated for various physical parameters and, the in vitro release studies were conducted as per USP. The drug release kinetic studies such as zero order, first order, Higuchi and Korsmeyer peppas were determined and compared.ANOVA in drug release of all the formulations were determined. Numerical optimization technique was applied to determine the best formulation. The most satisfactory formulations in MT and CPOP were studied for the influence of pH and agitation intensity on release of drug. The effect of osmotic pressure on the drugrelease was determined for the optimized formulation. The membrane morphology of the CPOP was studied using scanning electron microscopy (SEM). All the formulations were showed more controlled release compared to the marketed tablet studied. From the in vitro drug release kinetics, dissolution profile standards as per USP and also the effect of physiological factors on drug release, it was concluded that OP7 is the most satisfactory formulation. The porous osmotic pump tablets provide prolonged, controlled, and gastrointestinal environment-independent drug release than matrix tablets.

**Keywords:** Porous osmotic pump tablet; Matrix tablet; Diclofenac sodium;

Controlled release; Pore former; Osmotic agent.