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RESEARCH ARTICLE

THE EFFECT OF PLASTICIZER CONCENTRATION ON POLYMERIC TRANSDERMAL PATCH

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ABSTRACT

An effort was made to formulate drug free transdermal patches by using different polymers like ethyl cellulose, poly vinyl pyrrolidone and eudragit. Four groups of twelve formulations of drug free transdermal patches were prepared by solvent evaporation technique in which each group have different plasticizer concentration and evaluated for flatness, tensile strength, folding endurance, moisture content, Water vapor transmission rate (WVTR), percent elongation**.**

The tensile strength and folding endurance of the patches prepared with 20% Di-n-butylphthalate as plasticizer was high compared to patches prepared by 10% and 15 % Di-n-butylphthalate. The result of 20% plasticizer indicated that the patches would not break and would maintain their integrity with general skin folding when used. All the formulations show 100 % flatness. The WVTR was not significantly affected by varying the concentration of plasticizer (Di-n-butylphthalate). At concentration of 25 % of plasticizer the tensile strength and percent elongation not shows significant result due to soft and sticky formulation. On the basis of above observations we can easily concluded that the Di-n-butylphthalate at concentration 20% of polymers used as plasticizer for further developmental studies.

Key words: Di-n-butylphthalate, plasticizer, ethyl cellulose, tensile strength, transdermal patch.

INTRODUCTION

Transdermal drug delivery systems, known as patches, are dosage forms designed to deliver a therapeutically effective amount of drug across a patient's skin in a predetermined time and controlled rate[1, 2]. There are three critical considerations in the selection of a transdermal drug delivery system: adhesion to skin, compatibility with skin, and physical or chemical stability of total formulation and components[3]. The choice and design of polymers, adhesives, penetration enhancers and plasticizers in transdermal patches are also critical because they have a strong effect on drug release, permeability, stability, elasticity, and wearing properties of transdermal drug delivery systems[4]. The use of plasticizers in transdermal drug delivery systems are the improvement of film forming properties and the appearance of the film, decreasing the glass transition temperature of the polymer, preventing film cracking, increasing film flexibility and obtaining desirable mechanical properties[5]. Plasticizers are low molecular weight resins or liquids, which cause a reduction in polymerpolymer chain secondary bonding, forming secondary bonds with the polymer chains instead[6]. The main reasons of adding plasticizers to polymers, improving flexibility and process ability are counted[7,8]. By adding plasticizer to a polymeric material, elongation at break, toughness and flexibility are expected to increase, on the other hand tensile stress, hardness, are expected to decrease[9].

In the present study drug free patches of different polymers were formulated and evaluated. The effect of different concentrations of plasticizer viz. 10%, 15%, 20& and 25% on physicochemical properties of drug free patches was also studied.

MATERIAL AND METHOD

Di-n-butylphthalate (Loba Chemie), chloroform, methanol (S. D. Fine Chem. Ltd.), Ethyl cellulose (Kemphasol Ltd.). Poly vinyl pyrrolidone (Wockhardt Ltd.), aluminum foil purchased from local market. All other chemicals used were of analytical grade.

The drug free transdermal patch was fabricated by solvent evaporation technique using Mercury substrate method. The different polymers were weighed in same ratios and dissolve in 5 ml of solvents. The plasticizer (Di-n-butylphthalate) was added at different concentration and stirred to get clear solution. The polymeric solution was then poured slowly into a glass ring on the mercury surface. The solvent was allowed to evaporate at 25^0C for 24 h. The films were stored in desiccator until further evaluation. The composition of drug free transdermal patches is shown in Table 1.

Evaluation of the films/patches

The fabricated patch was subjected to physicochemical evaluation by using following tests.

Folding Endurance

The folding endurance is defined as the number of folds required to break any polymeric patch[10]. This was performed as a primary test to asses the strength and flexibility of film. This was determined by repeatedly folding the film at the same place until it broke. The number of time the film could be folded at the same place without breaking/cracking was taken as value of folding endurance[11,12].

