



RESEARCH ARTICLE

FORMULATION AND EVALUATION OF TOPICAL GEL CONTAINING HAIR GROWTH PROMOTERS FOR THE TREATMENT OF ANDROGENIC ALOPECIA

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The objective of present work was to develop and evaluate a Minoxidil emulgel and compare its properties with Minoxidil gels. When gel and emulsion are used in combination the dosage form is referred as Emulgel. For preparing the emulgel, first, Minoxidil was dissolved in solvent system comprising water and propylene glycol in ratio 35:15 with liquid paraffin as oil phase. The prepared w/o emulsion was then mixed with carbopol gel solution in 1:1 ratio and finally neutralized with triethanolamine to form emulgel. Total eight formulations were prepared of which four were gels and other four were Emulgels. The gels were evaluated for physicochemical parameters, *in vitro* drug release and *ex vivo* permeation study. Among developed formulations, F1 showed 56.30% cumulative release after 8 h, whereas F6 showed 72.31% release after 8 h.

Key words: Minoxidil, Emulgel, Spreadability, Carbopol 934, Alopecia.

INTRODUCTION

Androgenetic alopecia occurs in both men and women and is characterized by the progressive loss of hair from the scalp in a defined pattern. Alopecia means hair loss which is the most common problem of modern societies, which create much economical and psychological effect; affecting about 70% males and 30% females. Recently, a great effort has been made to treat hair loss or alopecia. One of the most common types of alopecia is androgenic alopecia and alopecia areata (Kaur *et al* 2010).

Chemically, Minoxidil is 2, 4-diamino-6-piperidinopyrimidine-3-oxide, soluble in water to the extent of approximately 2 mg/ml, is more readily soluble in propylene glycol or ethanol, and is nearly insoluble in acetone, chloroform, or ethyl acetate (Lowenthal and Affrime, 1980). Minoxidil was introduced in the early 1970s as a treatment for hypertension. Hypertrichosis was a common side-effect in those taking Minoxidil tablets and included the regrowth of hair in male

balding. Topically applied Minoxidil was shown to improve blood flow in human balding scalp. A topical formulation of Minoxidil then was developed to exploit this side effect (Gupta *et al* 2012). This led to the development of a topical formulation of emulgels which are, emulsions, either of the oil-in-water or water in oil type; gelled by mixing with a gelling agent. There is no marketed formulation of minoxidil emulgel till date. Therefore, present research has been undertaken with the aim to develop an emulgel formulation of minoxidil.

MATERIAL AND METHODS

Materials

Minoxidil (Yarrowchem Products, Mumbai), Carbopol 934 (Himedia laboratories Private Ltd, Mumbai), Propylene glycol, Triethanolamine, Ethanol, Propyl paraben, Span 80, Light liquid paraffin and mentha oil were purchased from Nice Chemicals, Kochin. All other chemicals and reagents used were of the analytical grade.