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Research Article

Optimization and evaluation of topical gel containing solid lipid nanoparticles loaded with luliconazole and its anti-fungal activity

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ABSTRACT
New topical pharmaceutical options are critically needed to obviate fungal infections. Luliconazole is a potent antifungal drug for the treatment of fungal infection. Due to bioavailability barriers of luliconazole, the current study is associated to develop an optimized topical luliconazole solid lipid nanoparticles (SLN) gel formulation against tropical fungal infection with prolonged therapeutic potential. Luliconazole loaded SLN were prepared through the solvent diffusion method using stearic acid & poloxamer 188 and optimized as per their entrapment efficacy. Thereafter, the optimized SLN wes subjected to physicochemical evaluation, followed by the preparation of different gel formulation. The physicochemical parameters of the optimized gel formulation (G3) were evaluated. Further anti-fungal activity of the G3 was determined against the growth of Candida albicans by TLC-Bioautography assay. The results reveal that SLN F6 shows a significant entrapment with 92.13%±0.975 entrapment efficacy. In particle size, size distribution and zeta potential analysis, SLN exhibit a mean particle diameter of ~344.3 nm, PDI of 0.168, intercept value 0.98 and zeta potential ~18.8 mV. The G3 shows a higher entrapment with 91.39%±0.187 entrapment efficacy and in-vitro drug release profile of the G3 with 1.5 % carbopol 934 w/v shown a sustained release profile with 79.57%±0.213 desolvation rate even after 24 hrs. The anti-fungal activity of SLN G3 gel showed a strong zone of inhibition of the growth of C. albicans. Hence, the study concludes that luliconazole loaded SLN G3 gel formulation containing 1.5% w/v carbopol 934 is suitable for topical application and having strong anti-fungal activity.

Keywords: Solid lipid nanoparticles, Luliconazole, Tropical gel formulation, Anti-fungal activity

INTRODUCTION

Fungal infection is generally characterized by the progressive onsets of species of fungi and causes severe health problems in immune-restricted individuals with high morbidity and mortality. It is greatly associated with the patients having hematologic, allogeneic, prolonged leukopenia and autologous grafts disorders. Fungal infections generally curve the whole body's system and lead the serious lethality to the body's cellular system[1]. The subcutaneous mycosis and is caused by the chronic fungal infection which targets dermis and the subcutaneous tissue and it is then termed as subcutaneous mycosis[2]. Sporotrichosis is one of the most common types of tropical infection caused by progressive onsets of the fungus Sporothrix schenckii[3]. For the inhibition of subsequent progression of any fungal infection, a drug should be much effective without having liabilities to produce any serious harm. The obvious and palliative choice for patients is the only way to cure the progressive prevalence of fungal infection. Although, the large number of pharmaceuticals are available in the market which are conventionally utilized as tropical medicaments for the treatment of cutaneous and subcutaneous fungal infections. The pharmaceuticals are available in form of creams, lotions, gels, etc. Due to bioavailability barriers or lack of availability of the drug to the therapeutic site is a major concern of patient compliance. Therefore, in light of the therapeutic concern of a topical anti-fungal drug, the release rate of the drug should be controlled by the type of formulation to achieve a sufficient therapeutic value and can provide an extended pharmacological effect[4],[5].

Solid lipid nanoparticles (SLN) are an advanced pharmaceutical novel drug delivery system (NDDS) in the modern era of pharmaceuticals. SLN was discovered in 1991, which represents traditional colloidal carriers such as polymeric