Formulation of paromomycin niosomes for skin leishmaniasis

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Abstract: Many drug formulations have been used for treatment of Leishmaniasis such as paromomycin sulfate (PM) which is one of the most important anti-leishmaniasis drugs. Topical dosage forms of this drug have been approved for treatment of cutaneous leishmaniasis but they have poor bioavailability due to low penetration across stratum corneum and macrophage membrane. For overcoming this problem, we prepared and evaluated the niosomal formulations of PM as a new penetrating enhancer technique.

The pharmaceutical characteristics of niosomes such as morphology, the mean volume diameter, physical stability of prepared vesicles and PM release from the various formulations were evaluated. PM concentration was measured by a microbiologic method (agar diffusion) against Staphylococcus epidermidis. Several patients in different age ranges, suffered from resistant cutaneous leishmaniasis in Bam, Kerman province, Iran, received bid PM niosomal formulation.

All used lipid combinations formed multilamellar vesicles (MLVs) with high physical stability and encapsulation efficiency about 60%. PM release from ST60 vesicles was slower than the other formulations due to the gel state structure of ST60 niosomes. In the presence of 50% cholesterol, ST80 vesicles showed some evidences of instability. This may be related to the unsaturated of the oleyl chain of the used surfactants. In all studied cases, the effectiveness of niosomal formulations were observed during 4 weeks treatment.

High efficiency of PM niosomal lotion in treatment of cutaneous leishmaniasis depicted the increased penetration of drug through skin and macrophages membranes. These results open a new season in the treatment of intracellular infections through topical application.

Keyword: Paromomycin sulfate, Cutaneous leishmaniasis, Niosomes, Stratum corneum, Skin transport