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Development and characterization of different solid lipid nanocarriers loaded with tamoxifen citrate/coenzyme Q10 biotherapy for treatment of breast cancer

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Nanotechnology based combinatorial therapy has emerged as an effective strategy for cancer treatment due to anticancer synergistic activity, reduction of drug-related toxicity, suppression of multi-drug resistance and overcoming biomedical barriers against successful delivery of anticancer drugs. Tamoxifen citrate (TC) and coenzyme Q10 (CoQ10) loaded into different types of solid lipid nanocarriers (SLNs) were developed for delivering anticancer/antioxidant drug biotherapy into cancerous cells. Stearic acid (2% w/v) and poloxamer 188 (3%w/v) were selected as optimal lipid matrix and surfactant, respectively for developing biotherapy SLNs. Particle size, polydispersity index (PDI) and zeta potential were 266 nm, 0.741 and -27.5 mv, respectively while, the % encapsulation efficiency (%EE) of TC and CoQ10 were 87% and 38%, respectively. Incorporation of lecithin into lipid matrix has significantly reduced particle size and increased %EE of CoQ10 to 45%. Nanostructured lipid carriers (NLC1) decreased particle size to 81nm and increased %EE to 94% and 56% for TC and CoQ10, respectively. Lipid nanocapsules (LNC2) showed significant effect on decreasing both particle size to 36 nm and %EE to 48% and 30% for TC and CoQ10, respectively. All lipid nanocarriers offered controlled drugs release profiles. Formulations contain phospholipid (SLN11 and NLC1) showed good fitness to Higuchi model with prominent controlling effect for NLC1. Lipid nanocarriers significantly improved TC/CoQ10 permeation through intestinal mucosa with a prominent efficacy to formula SLN11. The study greatly suggests use of TC/CoQ10 solid lipid nanocarriers as potential delivery systems in breast cancer treatment.

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Evaluation of the use of modified cocoa butter and shea butter as bases for metronidazole suppositories for children in tropical climate

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The rectal route for drug administration is becoming attractive to the drug formulators because it can avoid hepatic first-pass effects, decrease gastrointestinal side effects and avoid undesirable effects of meals and drug adsorption. In children, nausea and vomiting are some of the objectionable side effects resulting from oral administration of metronidazole. Therefore, there is the need for formulation of metronidazole as a suppository and as a way of circumventing the side effects associated with oral administration of drugs. There is paucity of information about the use of cocoa butter and shea butter as bases (natural products) for metronidazole suppositories. This study, therefore, formulates and evaluates metronidazole suppositories and improves the hydrophilicity of the bases (cocoa butter and shea butter) by surfactants (Tween 20) in order to optimize the drug released from them. The interacting effect of formulation variables on the physicochemical properties of the drug vis-a-vis the release of metronidazole from the suppositories was controlled through modification of the bases (by softening) in order to make them suitable as metronidazole suppository bases for children in tropical climate. The cocoa butter and shea butter were modified according to the method of Mital and Dove (1971). Among the physicochemical parameters, maximum absorption and wavelength of the λmax were determined by UV spectrometer in the range of 200-400 nm and colour identification by British Pharmacopoeia (BP) (1988). The melting point was determined by modified method of Adedayo (1985); hardness by using Monsato hardness tester; degradation time by method similar to BP (1988). The kinetics of metronidazole release was also determined with first order mode. Factorial experimental design and data analysis were carried out to determine whether there were interactions between the two variables. The results indicate that there were high level of significances at 5% confidence interval and that cocoa butter releases the drug from the suppository more and faster than shea butter.

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