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Improving the bioavailability of favipiravir by using human serum albumin nanoparticles

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Favipiravir (FAV) is an antiviral agent that inhibits RNA-dependent RNA polymerase of several RNA viruses such as Ebola virus and now COVID-19. It classified as BCS class IV drug. In this study, a Favipiravir-loaded human serum albumin nanoparticles (FAV-NPs) were prepared to overcome the low solubility and low permeability. The FAV-NPs were prepared by pH-dependent coacervation method with glutaraldehyde (as a crosslinking agent). The FAV-NPs were investigated for both gastrointestinal and nose-to-brain conditions. This method has been optimized based on several factors such as drug:HSA ratio, pH, amount of crosslinker and incubation time of drug-HSA. The prepared FAV-NPs were characterized regarding to particle size, PDI, zeta potential (before and after freeze-drying) and encapsulation efficiency (EE%) (by using a validated HPLC-DAD method). The study showed the optimized formulation was reached by applying 1:1 drug:HSA ratio, pH = 7.6 ± 0.1, 60 µl of glutaraldehyde 8%*v/v* and 80 min incubation time. The optimized FAV-NPs showed 203 nm particle size with a zeta potential of -34.1 mV and 0.25 of PDI before freeze-drying, whereas 210 nm particle size, -25.9 mV zeta potential and 0.195 of PDI after freeze-drying, respectively. The developed HPLC-DAD method was a sensitive, accurate and precise for determination of FAV. According to this analytical method we found that EE% was 99.72 %.

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