



Preparation and evaluation of carvacrol pellets based on PVP solid-dispersion by extrusion-spheronization technique

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Background and objectives: Carvacrol is one of the main pharmacologically active components of *Thymus vulgaris* essential oil which has shown several therapeutic effects. There are few works regarding the formulation of essential oils as oral solid dosage forms due to their liquid nature, stability and technical problems. The aim of this study was to combine the solid-dispersion approach and extrusion-spheronization technique to produce pellets with desirable physico-mechanical and release properties. **Methods:** Solid dispersion matrix (30%) of carvacrol in polyvinylpyrrolidone K30 was prepared by solvent evaporation. The matrix was mixed with Avicel and lactose and granulated by water. The wet mass was transformed into pellets by extrusion-spheronization. In order to compare the solid dispersion method with the classic approaches, another pellet formulation was prepared by absorption of carvacrol on Aerosil. The pellets were characterized for size (sieve analysis), shape factors (image analysis), mechanical strength, carvacrol content, and release rate (dissolution test). Accelerated stability test of formulations was also carried out. **Results:** Using suitable composition of solid dispersion matrix and granulation fluid, the pellets with desirable size and shape and mechanical properties could be produced. PVP-based pellets had higher mechanical strength, slower release rate and improved content and stability. The PVP ratio showed considerable effect on release properties of the pellets. **Conclusion:** Overall, the results revealed the feasibility of preparing desirable pellets containing carvacrol with acceptable content, stability and release properties which can be administered as hard gelatin capsules.

Keywords: carvacrol, extrusion-spheronization, pellet, solid dispersion, *Thymus vulgaris*