28th International Conference on
CHEMISTRY & DRUG DESIGNING
December 05-06, 2018 | Vancouver, Canada

Comparative analysis of carvedilol and nimodipine using hollow mesoporous silica nanoparticles as an insoluble drug carrier (a novel and facile method)

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Statement of the problem: Hollow mesoporous silica nanoparticles (HMSNs) are one of the most promising carriers for drug delivery. However, a facile method to synthesize HMSNs has rarely been reported so far. The primary objective of this study was to prepare HMSNs by a simple and inexpensive method and then use this method to load two antihypertensives thus nimodipine and carvedilol. Afterward several *in vitro* analysis were done and a comparative conclusion drawn.

Methodology & Theoretical Orientation: In our present study, we focused on a simple and flexible strategy to fabricate the HMSNs. During the synthesis process, TEOS (cetyltrimethylammonium bromide) and CTAB (cetyltrimethylammonium bromide) were used as the hard and the mesoporous template agents, respectively. To remove the template and create a hollow cavity in mild condition, (90°C) was used instead of calcination or solvent the solvent process. The morphology of the HMSNs was observed by SEM and TEM. FT-IR was also used to determine the structure. The specific surface area, specific pore diameter, and specific pore volume were investigated by nitrogen adsorption/desorption isotherms.

Findings, Conclusion, and Significance: In summary, the HMSNs with a hollow core was successfully prepared through a novel and facile method by using hot water to remove the template and expand the internal cavity. The prepared HMSNs with an average size of 450nm exhibited a relatively high specific surface area of 950.84m2/g, as well as significant pore diameter (4.18nm) and high CAR-NM drug loading of (40.22%±0.73)% and (50.22%±0.83)%. The saturation solubility studies indicated that the solubility of the two drugs was successfully increased compared to that of pure CAR and NM. Moreover, *in vitro* studies showed that the HMSN/CAR and HMSN/NM drug delivery system exhibits sustained release performance.

Biography

Samuel Kesse, a registered pharmacist in Ghana and currently pursuing his masters' degree in Pharmaceutics at China Pharmaceutical University has an expertise in chemistry and drug designing. As a young researcher, his focus is contributing his quota to the science world. This research focused on a simple and flexible strategy to fabricate the HMSNs. During the synthesis process, TEOS (cetyltrimethylammonium bromide) and CTAB (cetyltrimethylammonium bromide) were used as the hard and the mesoporous template agents, respectively.

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