

Drug Delivery 2015 : Synthesis of natural macroporous sporopolline exine capsules extracted from *Phoenix dactylifera* L. and their application in oral colon-specific delivery of Ibuprofen - Hamad A Al-Lohedan - King Saud University

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In this work, we have extracted Sporopollenin Macroporous Capsules (SMC) from date palm (*Phoenix dactylifera* L.) spores which were further coated by natural polymer composites (chitosan with gluteraldehyde). The polymer coated capsules were used in the in vitro controlled delivery of ibuprofen. Characterization of the materials were performed by SEM, XRD and nitrogen adsorption-desorption isotherms together with spectral and thermal analyses. Effect of various factors such as pH, temperature and initial concentration was seen on the ibuprofen releasing. The loading of ibuprofen increased by decreasing its concentration and followed the Langmuir adsorption isotherm. pH 6.0 was found to be the most favorable pH for the loading of ibuprofen at which 97.2% (50 mg/ml) drug was loaded to the capsules. The release of ibuprofen was faster when the pH was changed from 1.4 to 7.4. Cytotoxicity results of SMC and its capsules were also tested against human intestinal Caco-2 cell line using MTT assay which has shown that all the materials in the study were biocompatible. *Phoenix dactylifera*, regularly known as date or date palm is a blooming plant animal categories in the palm family, Arecaceae, developed for its palatable sweet natural product. In spite of the fact that its accurate spot of source is unsure in view of long development, it most likely started from the Fertile Crescent locale riding among Egypt and Mesopotamia. The species is broadly developed across Northern Africa, the Middle East, the Horn of Africa and South Asia, and is naturalized in numerous tropical and subtropical areas worldwide. [4][5][6] *P. dactylifera* is the sort types of variety Phoenix, which contains 12–19 types of wild date palms, and is the significant wellspring of business production. Date trees regularly reach around 21–23 meters (69–75 ft) in height, developing independently or shaping a cluster with a few stems from a solitary root framework. Date organic products (dates) are oval-round and hollow, 3 to 7 centimeters (1.2 to 2.8 in) long, and about 2.5 centimeters (0.98 in) in measurement, running from splendid red to brilliant yellow in shading, contingent upon assortment. At around 61–68 percent sugar by mass when dried, dates are a sweet natural product. Sporopollenin is one of the most synthetically latent organic polymers. It is a significant part of the intense external (exine) dividers of plant spores and dust grains. It is artificially entirely

steady and is normally very much safeguarded in soils and dregs. The exine layer is frequently complicatedly designed in species-explicit examples, permitting material recuperated from (for instance) lake silt to give valuable data to palynologists about plant and parasitic populaces before. Sporopollenin has discovered uses in the field of paleoclimatology too. Sporopollenin is likewise found in the cell dividers of a few taxa of green alga, including *Phycopeltis* (a ulvophyceae) [2] and *Chlorella*. Spores are scattered by a wide range of natural variables, for example, wind, water or creatures. On the off chance that the conditions are reasonable the sporopollenin-impregnated dividers of dust grains and spores can persevere in the fossil record for a huge number of years, since sporopollenin is impervious to concoction debasement by natural and inorganic synthetic compounds. Ibuprofen is a medicine in the nonsteroidal calming drug (NSAID) class that is utilized for rewarding torment, fever, and inflammation. This incorporates difficult menstrual periods, headaches, and rheumatoid arthritis. It might likewise be utilized to close a patent ductus arteriosus in an untimely baby. It can be utilized by mouth or intravenously. It normally starts working inside an hour. Normal symptoms incorporate acid reflux and a rash. Compared to different NSAIDs, it might have less reactions, for example, gastrointestinal bleeding. It builds the danger of cardiovascular breakdown, kidney disappointment, and liver failure. At low dosages, it doesn't seem to expand the danger of coronary episode; be that as it may, at higher portions it may. Ibuprofen can likewise compound asthma. While it is muddled in the event that it is sheltered in early pregnancy, it has all the earmarks of being destructive in later pregnancy and along these lines isn't recommended. Like different NSAIDs, it works by restraining the creation of prostaglandins by diminishing the action of the chemical cyclooxygenase. Ibuprofen is a more fragile mitigating specialist than other NSAIDs. Ibuprofen was found in 1961 by Stewart Adams at Boots UK Limited and at first promoted as Brufen. It is accessible under various exchange names, including Nurofen, Advil and Motrin. It was first advertised in 1969 in the United Kingdom and in the United States in 1974. It is on the World Health Organization's List of Essential Medicines. It is accessible as a nonexclusive

medication. The discount cost in the creating scene is somewhere in the range of US\$0.01 and US\$0.04 per dose. In the United States, it costs about US\$0.05 per dose. In 2017, it was the 28th most regularly recommended drug in the United States, with in excess of 24 million remedies. The Langmuir-adsorption model predicts an asymptotic way to deal with monolayer surface inclusion as adsorbate halfway weight approaches immersion; this is the Type-I isotherm of Figure 5.7. The Langmuir model, however demonstrated for some ultraclean, all around requested surfaces associating with little atom adsorbates, is misrepresented for some certifiable frameworks. In any case, it is the establishment whereupon quite a bit of adsorption hypothesis is fabricated and as such gives a helpful applied premise to understanding the procedure. In fact, a significant number of the other adsorption models delineated beneath treat the first monolayer as Langmuirian, at that point just extra further terms to depict the adsorption of resulting layers. For adsorption to stop at one monolayer, the

propensity for mass buildup of the adsorbate must be little under the chose test states of temperature and weight. Along these lines, "unadulterated" Langmuir-type conduct, in which there is no noticeable adsorption past the first monolayer, is regularly observed.

Biography

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