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DEVELOPMENT AND IN-VITRO EVALUATION OF
DICLOFENAC SODIUM SPRAY-DRIED WITH POLYACRYLATE
AND SODIUM CARBOXYMETHYLCELLULOSE

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กุลวีร์ ภมรานนท์ : การพัฒนาและการประเมินผลทางอินวิโทรของไดโคลฟีแนคโซเดียมพ่นแห้งร่วมกับพอลิอะคริเลตและโซเดียมคาร์บอกซีเมทิลเซลลูโลส. (DEVELOPMENT AND IN - VITRO EVALUATION OF DICLOFENAC SODIUM SPRAY-DRIED WITH POLYACRYLATE AND SODIUM CARBOXYMETHYLCELLULOSE)
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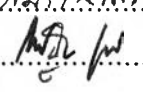
การเตรียมไดโคลฟีแนคโซเดียมไมโครสเฟียร์โดยวิธีเทคนิคการพ่นแห้งโดยใช้ส่วนผสมสองชนิดพอลิอะคริเลตและโซเดียมคาร์บอกซีเมทิลเซลลูโลส (ยูคราจิต อาร์ดี 100, ยูคราจิต อาร์แอล 30 ดี ร่วมกับโซเดียมคาร์บอกซีเมทิลเซลลูโลส) เป็นพอลิเมอร์เมทริกซ์และใช้คอลลอยคอลลิจิกา (แอโรซิล) ในปริมาณ 15 และ 30 เปอร์เซ็นต์ของน้ำหนักยาและพอลิเมอร์ เป็นสารลดแรงยึดเกาะ การประเมินคุณสมบัติทางเคมีฟิสิกส์ของผงพ่นแห้งที่ได้และการปลดปล่อยด้วยจากไมโครสเฟียร์ ได้ทำการศึกษาผลของตัวแปรในกระบวนการคืออุณหภูมิของลมเข้าและอัตราเร็วในการพ่นแห้งซึ่งพบว่าเมื่ออุณหภูมิของลมเข้ารวมทั้งอัตราเร็วในการพ่นแห้งด้วยพบว่ารูปร่างของผงพ่นแห้งมีแนวโน้มที่จะกลมและเรียบขึ้นเมื่อมีปริมาณแอโรซิลที่มากขึ้นและอุณหภูมิที่ใช้ในการพ่นแห้งสูงขึ้น ในขณะที่อัตราเร็วในการพ่นแห้งลดลงจะทำให้ขนาดของอนุภาคลดลงเล็กน้อย อัตราการไหลของผงพ่นแห้งชนิดต่างกันให้ผลคล้ายกันและมีคุณสมบัติการไหลที่ดีขึ้นเมื่อเติมแอโรซิลลงไป ในสูตรตำรับ อินฟราเรดสเปกตรัมแสดงให้เห็นว่าไม่เกิดปฏิกิริยาระหว่างตัวยาและพอลิเมอร์ เส้นฐานที่สูงขึ้นของเอ็กซ์เรย์ดิฟแฟรคโตแกรมและการเปลี่ยนแปลงตำแหน่งของเอนโดเทอร์มิกพีคและเอกโซเทอร์มิกพีคของดีเอสซีเทอร์โมแกรมของไมโครสเฟียร์ที่เตรียมได้แสดงผลให้ทราบว่ามีการเปลี่ยนแปลงของสัณฐานเกิดขึ้น การปลดปล่อยตัวยาไดโคลฟีแนคโซเดียมในระบบที่มีการเปลี่ยนแปลงพีเอชจะเพิ่มขึ้นเมื่อปริมาณของพอลิเมอร์ลดลงและปริมาณของแอโรซิลเพิ่มขึ้น รูปแบบการปลดปล่อยตัวยาเมื่อเตรียมโดยใช้พอลิเมอร์ชนิดต่างกันให้ผลที่คล้ายกัน ไมโครสเฟียร์ที่เตรียมโดยยูคราจิต อาร์ดี 100 อัตราส่วนระหว่างพอลิเมอร์และตัวยา 1:1.5 ทำการพ่นแห้งที่อุณหภูมิลมเข้า 130 องศาเซลเซียส, อัตราเร็วในการพ่นแห้ง 20 มิลลิลิตรต่อนาทีโดยใช้แอโรซิล 30 เปอร์เซ็นต์ของน้ำหนักยาและพอลิเมอร์พบว่าผลการปลดปล่อยตัวยาคู่กับผลิตภัณฑ์ที่มีจำหน่ายตามท้องตลาด

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ลายมือชื่ออาจารย์ที่ปรึกษา..........

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KEY WORD : DICLOFENAC SODIUM / SPRAY DRYING / IN-VITRO EVALUATION

KULAVI PAMARANON : DEVELOPMENT AND IN – VITRO EVALUATION
OF DICLOFENAC SODIUM SPRAY - DRIED WITH POLYACRYLATE AND
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Diclofenac sodium microspheres were prepared by spray drying technique. Two combinations of a polyacrylate and sodium carboxymethylcellulose (Eudragit® RD 100, Eudragit® RL30D with sodium carboxymethylcellulose) were used as polymeric matrices. Colloidal silica (Aerosil®200) of 15 and 30 percent weight by weight of drug and polymer content was added as an antiadherent. The physicochemical properties of spray dried powders and the release of drug from microspheres were evaluated. The influence of processing variables such as inlet temperature and feed rate on the physicochemical properties and release patterns of spray dried powders were also studied. The scanning electron photomicrographs showed different shape and size of powders when prepared with different types and amount of polymer including amount of Aerosil®200 and different inlet temperature and feed rate. The powders tended to be smoother and more spherical when increasing the inlet temperature and amount of Aerosil®200 whereas the size seemed to be smaller when decreasing the feed rate. The flow rate from various spray dried powders showed similar results but improved when adding Aerosil®200 in the formulation. The IR spectra revealed no interaction between drug and polymers. The higher baseline of X-ray diffractograms and the shift of exothermic and endothermic peaks in DSC thermograms of the microspheres seemingly showed an appearance of amorphous form. The release of drug in pH change system increased with the decrease in the amount of polymer and the increase in the amount of Aerosil®200. The release patterns from various polymers seemed to be similar. Microspheres which prepared by Eudragit®RD 100 at the polymer to drug ratio of 1:1.5 and sprayed at 130°C, feed rate of 20 ml/min with Aerosil 30 percent weight by weight of drug and polymer content showed the release of drug similar to the commercial products.

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Field of study...Industrial Pharmacy..... Advisor's signature... *Garnpimol C. Ritthidej*
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LIST OF ABBREVIATIONS

A	Aerosil200
bar	kg/cm ²
°C	degree celcius (centrigrade)
cm	centimeter(s)
DS	diclofenac sodium
DSC	differential scanning calorimetry
e.g.	exempli gratia, for example
et al	et alli, and others
g	gram(s)
HCl	hydrochloric acid
hr	hours
i.e.	that is
IR	infrared
kg	kilogram(s)
KH ₂ PO ₄	potassium dihydrogen phosphate
min	minute(s)
mg	miligram(s)
ml	mililitre(s)
N	normality
NaOH	sodium hydroxide
NF	The National Formulary
nm	nanometer(s)
No.	number
pH	the negative logarithm of the hydrogen ion concentration
pKa	the negative logarithm of the acid dissociation constant
q.s.	make to volume
r ²	coefficient of determination
% RH	percentage of relative humidity
RT	room temperature

RT	room temperature
rpm	revolution per minute
SD	standard deviation
SEM	scanning electron photomicrograph
USP	The United States Pharmacopeia
UV	ultraviolet
w/w	weight by weight
w/v	weight by volume
µg	microgram(s)
%	percentage