ICPPS 2014

Proceeding

The 1st International Conference on Pharmaceutics & Pharmaceutical Sciences

Drug Delivery Systems:
From Drug-Discovery, Pre-formulation, Formulation and Technological Approaches for Poorly Soluble Drugs and Protein

The 1st International Conference on Pharmaceutics & Pharmaceutical Sciences Proceedings

ISBN : 978-602-72333-0-0
(Letter of National ISBN Agency No. 4127/E.8/p/03.2015 Date 18 March 2015)

1st edition Proceeding
Published by:
Faculty of Pharmacy Universitas Airlangga
Surabaya, Indonesia

Address:
Kampus B Jl. Dharmawangsa Dalam
Surabaya 60286
Phone +62 31 5033710
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Website: www.icpps2014.com or www.ff.unair.ac.id
Email: icppinfo@gmail.com

ISBN 978-602-72333-0-0

PREFACE From Chairman

It is our pleasure to present you the proceedings of The 1st International Conference on Pharmaceutics and Pharmaceutical Sciences (ICPPS) organized by The Faculty of Pharmacy Universitas Airlangga Surabaya Indonesia.

The proceeding was produced based on papers and posters presented at The 1st International Conference on Pharmaceutics and Pharmaceutical Sciences (ICPPS), held in Surabaya, Indonesia, 14-15 November 2014.

The proceeding clearly reflects broad interest, from the participants that coming from all around the world.

The papers presented were pharmaceutics and biopharmaceutics; requirements on how to evaluate molecules in discovery and their appropriateness for selection as potential candidate; their development in context of challenges and benefits, together with associated time and cost implications and also requirements to progress through pre-clinical and clinical.

In this an opportunity, I would like to express my appreciation to the editorial team of the proceeding who have been working hard to review manuscripts, and making the first edition of this proceeding be possible.

I would like also to thanks to all invited speakers and presenters who participated in The 1st International Conference on Pharmaceutics and Pharmaceutical Sciences (ICPPS) and your contribution to this proceeding.

Finally, I hope this proceeding will give contribution to the Pharmaceutics and Pharmaceutical Sciences research.

Chairman,

Dra. Esti Hendradi, MSI., Ph.D., Apt

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DEVELOPMENT OF MELOXICAM TRANSDERMAL MATRIX TYPE PATCH USING POLYVINYLPYRROLIDONE, HYDROXYPROPYL METHYLCELLULOSE, AND ETHYL CELLULOSE COMBINATION

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INTRODUCTION

Transdermal drug delivery system is an administration of a therapeutic agent in the form of patches or semisolids that deliver drugs through intact skin for systemic effect1. The advantages of transdermal drug delivery systems are to avoid of hepatic first pass metabolism, ability to discontinue administration by removal of the system, to controll drug delivery for a longer time than the usual gastrointestinal transit of oral dosage form3, to prevent irritation of the digestive tract8, improves patient compliance3. Transdermal drug delivery systems may prevent the drug from enzymatic reactions in the gastrointestinal tract wall5

Meloxicam is a nonsteroidal anti-inflammatory drug (NSAID) class enolate acid derivative oxicam6. Meloxicam inhibit the synthesis of cyclooxygenase-2 (COX-2) and prostaglandin2. Meloxicam has a partition coefficient octanol / water (log P octanol / water) 3.43 and a molecular weight 351.4 Dalton4. The dose of Meloxicam is 7.5-15 mg / day7. Meloxicam was reported as a drug that can be applied to skin and mucosa because meloxicam has lower tissue toxicity than piroxicam, ketoprofen, indomethacin, diclofenac and ibuprofen6

The important component in the preparation of the patch is a polymer. The polymer used in this patch are hydrophilic and hydrophobic polymer. This research would be develop Meloxicam transdermal patch with some of hydrophilic and hydrophobic polymers, ethylcellulose (EC) -polivinilpirolidon (PVP), hydroxypropylmethylcellulose (HPMC) - EC, then compared the physical properties and the release of Meloxicam between the formulas.

MATERIALS AND METHODS

Meloxicam was obtained as a gift sample from PT. Dexa Medica, HPMC, PVP K-30, Ethyl Cellulose N-22, Propylene glycol, Polyethylene glycol, Potassium Chloride, Potasium Phosphate Dibasic, Sodium Phosphate Dibasic, Sodium Chloride, Backing, Aquadest

Formulation of transdermal patches

Matrix type transdermal patches containing Meloxicam were prepared by solvent casting technique. HPMC or PVP K30 and EC-N22 solution was prepared using ethanol as solvent. Polymeric solutions were mixed thoroughly with the help of magnetic stirrer for 15 minutes. Meloxicam was added to propylene glycol and polyethyleneglycol and stirred for 30 minutes and then were poured into mold and dried at room temperature for 24 hours. The composition of transdermal patches is shown in Table 1.

Material	Formula (mg)					
	F1	F2	F3	F4	F5	F6
Meloxicam	7.5	7.5	7.5	7.5	7.5	7.5
PVP	57.75	38.5	19.25	-	-	-
HPMC	-	-	-	57.75	38.5	19.25
EC	134.75	154	173.25	134.75	154	173.25
Propylene glycol	150	150	150	150	150	150
Plasticizer	150	150	150	150	150	150
Total	500	500	500	500	500	500

Table 1. The Composition of Meloxicam Transdermal Patches

Evaluation Test

The prepared formulation were evaluated for different physiochemical characteristics such as color, odor, consistency, weight uniformity, thickness, moisture content, drug content and in vitro release study.

RESULTS AND DISCUSSION

Formulation and Evaluation of Meloxicam Transdermal Patch

Transdermal drug delivery system containing Meloxicam was prepared by using different polymeric ratios of HPMC, PVP and hydrophobic polymer of EC in combination. The meloxicam patchs can be seen in Fig.1. They all yellow, odorless, and dry. The results of various physico-chemical parameters were listed in Tables 2 The weight of the patches varied from 535.53 ± 0.67 to 574.53 ± 0.40 mg. The thickness of the patches varied from 0.224±0.001 to 0.229±0.001mm

Meloxicam in methanol was scanned in the UV wavelength region of 200-400 nm for maximum absorption (λ max). The λ max was found to be at 364 nm. Linear relationship was observed between the concentration and absorbance value. (Slope=0.045, r=0.998). This regression equation was used to calculate the drug content of meloxicam patch.

The drug content of meloxicam patches were list in Table 3. They varied from 96.833 ± 0.673 to 98.200 ± 0.610 %. There were in accordance with the requirement of that the drug content was range 85% - 115% and the coefficient variation is less than 6 %.

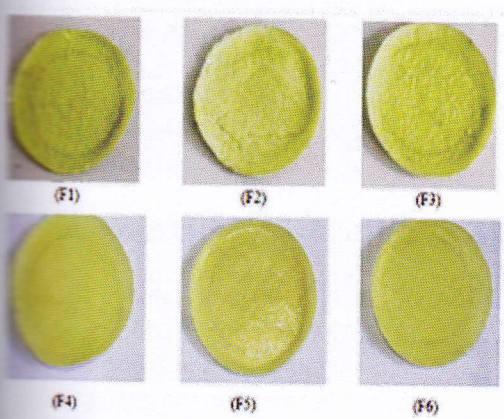

Fig.1 The Meloxicam Patch of Various Formulation

Fig.1 The Meloxicam Patch of Various Formulation

Formula	Appearance	Weight uniformity (mg) ±SD	Thickness (mm) ±SD
F1	Less smooth, less flexible	548.43 ± 0.71	0.226 ± 0.002
F2	Less smooth, less flexible	558.46 ± 0.70	0.227 ± 0.001
F3	Less smooth, less flexible	563.80 ± 0.60	0.224 ± 0.002
F4	Smooth, flexible	574.53 ± 0.40	0.227 ± 0.007
F5	Smooth, flexible	535.53 ± 0.67	0.224 ± 0.002
F6	Smooth, flexible	556.40 ± 0.72	0.229 ± 0.001

Table 2: Physicochemical Properties of Meloxicam patches

The moisture content in the formulations ranged from 3.528±0.024 to 7.530±0.023 %. The highest percentage of moisture content was found in F1 7.530 ± 0.023 % respectively which may be due to the hygroscopicity of nature of PVP. The highest percentage of moisture content of HPMC patchs was found in F4 because it was the highest concentration of HPMC in patch. The results of patch's drug content and moisture content were listed in Table 3.

The In vitro drug release studies were carried out using cellophane membrane. The cellophane was mounted on the diffusion cell which acted as a donor compartment. 500 ml of phosphate buffer saline pH 7.4 as a diffusion medium was taken in the dissolution chamber which acted as the receptor compartment to maintain the sink condition. The donor compartment was kept in contact with receptor compartment and receptor compartment was stirred with paddle during the study. Sample 5 ml was withdrawn and replaced with 5 ml of PBS pH 7.4 at different time intervals. The samples were analyzed using UV spectrophotometer at 364 nm to estimate Meloxicam.

Meloxicam in PBS was scanned in the UV wavelength at 364 nm. Linear relationship was observed between the concentration and absorbance value. (Slope=0.0293, r=0.9933). This regression equation was used to calculate the drug content on in vitro release study of

meloxicam patch. Flux of Meloxicam release study from patches can be seen in Fig.2.

Formula	Drug content (%) ±CV	Moisture content (%)
F1	97.833 ± 0.461	7.530 ± 0.023
F2	97.167 ± 0.079	5.383 ± 0.006
F3	96.833 ± 0.673	3.553 ± 0.030
F4	98.200 ± 0.610	5.332 ± 0.030
F5	97.266 ± 0.566	3.964 ± 0.024
F6	97.166 ± 0.875	3.528 ± 0.024

Table 3. Drug Content and Moisture Content Properties of Meloxicam patches

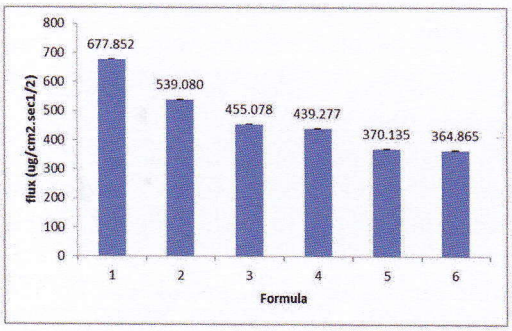

Fig 2. Flux of Meloxicam release study from patches

The flux ranged from 364,865 to 677,851 µg/cm2.second1/2. The highest flux was found in formulation F1677,851 µg/cm2.second1/2, respectively which may be due to the nature of PVP (Fig.2).

CONCLUSION

Meloxicam patch in PVP-EC had moisture content and Meloxicam flux release higher than Meloxicam patch in HPMC-EC polymers. The highest flux and moisture content was on the highest PVP in Meloxicam patch formula.

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