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

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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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# TABLE of CONTENT

Preface from Chairman ........................................... ii
Committee ......................................................... ii
Table of Contents .................................................. iii
Author Index ....................................................... iii

## AUTHOR INDEX

COMPARISON OF SODIUM STARCH GLYCOLATE AND CROSSCARMELLOSE SODIUM AS SUPERDISINTEGRANT IN MEFENAMIC ACID FAST DISINTEGRATING TABLET
Adeltrudis Adelsa D, Oktavia Eka Puspita, Amalia Ayuningtyas, Marulita Isadora .......................... 1

STUDY EXPRESSION OF HUMAN ERYTHROPOIETIN EXPRESSION IN MAMMALIAN CELL
Adi Santoso, Popi Hadiviiswuardhani, Yana Rubiana, Yulaika Romadhani, Endah Puji Septisetyani, Dyaningtyas D.P. Putri ............................................. 4

ANTIOXIDANT STABILITY ASSAY OF ALPHA TOCOPHERYL ACETATE IN SOLID LIPID NANOPARTICLE SYSTEM (LIPID BASE BEESWAX AND MONOSTEARIC GLISERYL 50:50)
Anggie Widhi, Noorma Rosita, Widji Soeratri ................................................................. 8

A BIOACTIVE BOVINE HYDROXYAPATITE–GELATIN IMPLANT FOR IN VITRO GENTAMICIN RELEASE
Aniek Setiya Budiatin, M. Zainuddin, Junaidi Khotib, Diah Himawati .................................. 13

EFFECT OF COMPARISON SURFACTANT AND COSURFACTANT IN WATER/OIL MICROEMULSION IN RELEASE OF OVALBUMIN Microemulsion Water/Oil with Surfactant (Span 8O-Tween 80) :
Cosurfactant (Ethanol) =5:1, 6:1, and 7:1)
Anisa Rizki Amalia, Riesta Primaharinastiti, Esti Hendradi ............................................... 18

ANALYSIS OF MYCOLIC ACIDS CLEAVAGE PRODUCT OF Mycobacterium tuberculosis BY GAS CHROMATOGRAPHY-FLAME IONIZATION DETECTOR
Asri Darmawati, Deby Kusumaningrum, Isnaeni, Muhamad Zainuddin .................................. 21

PERIPLASMIC EXPRESSION OF GENE ENCODING ANTI-EGFRvIII SINGLE-CHAIN VARIABLE FRAGMENT ANTIBODY USING PeIB LEADER SEQUENCE IN ESCHERICHIA COLI
Kartika Sari Dewi, Debbie Sofie Retnoningrum, Catur Riani, Asrul Muhamad Fuad .................. 24

IN VIVO ANTIMALARIAL ACTIVITY OF ETHANOL EXTRACT AND ETHYL ACETATE FRACTION OF Alectryon serratus LEAVES ON Plasmodium berghei INFECTED MICE
Aty Widyawaruyanti, Uswatun Khasanah, Lidya Tumewu, Hilkatul Ilmi, Achmad Fuad Hafid, Indah S Tantular ......................................................... 30

PROFILE OF COMMUNITY PHARMACISTS KNOWLEDGE IN PATIENT ASSESSMENT WITH INFLUENZA SYMPTOMS AND ITS PRODUCTS
Azza Faturrohmah, Arie Sulistyarini, Ana Yuda ............................................................... 33
DEVELOPMENT OF MELOXICAM TRANSDERMAL MATRIX TYPE PATCH USING POLYVINYLPYRROLIDONE, HYDROXYPROPYL METHYLCELULOSE, 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 control 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 of piroxicam9. Meloxicam inhibit the synthesis of cyclooxygenase-2 (COX-2) and prostaglandin. 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)- polyvinilpirolidon (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. Deka Medica, HPMC, PVP K-30, Ethyl Cellulose N-22, Propylene glycol, Polyethylene glycol, Potassium Chloride, Potassium 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-N-22 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 polyethylene glycol and stirred for 30 minutes and then were poured into mold to dried at room temperature for 24 hours. The composition of transdermal patches is shown in Table 1.

<table>
<thead>
<tr>
<th>Material</th>
<th>Formula (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
</tr>
<tr>
<td>Meloxicam</td>
<td>7.5</td>
</tr>
<tr>
<td>PVP</td>
<td>57.75</td>
</tr>
<tr>
<td>HPMC</td>
<td>-</td>
</tr>
<tr>
<td>EC</td>
<td>134.75</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>150</td>
</tr>
<tr>
<td>Plasticizer</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
</tr>
</tbody>
</table>

Table 1. The Composition of Meloxicam Transdermal Patches

Evaluation Test
The prepared formulation were evaluated to different physicochemical 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 patches 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±0.001 mm. 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 listed 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 %.

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 PVP patches was found in F4 because it was the highest concentration of PVP 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

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

Table 2: Physicochemical Properties of Meloxicam patches

![Fig.1 The Meloxicam Patch of Various Formulation](image-url)
Meloxicam patch. Flux of Meloxicam release study from patches can be seen in Fig. 2.

<table>
<thead>
<tr>
<th>Formula</th>
<th>Drug content (%) ± CV</th>
<th>Moisture content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>97.33 ± 0.461</td>
<td>7.63 ± 0.023</td>
</tr>
<tr>
<td>F2</td>
<td>97.16 ± 0.79</td>
<td>5.38 ± 0.006</td>
</tr>
<tr>
<td>F3</td>
<td>96.83 ± 0.673</td>
<td>3.65 ± 0.030</td>
</tr>
<tr>
<td>F4</td>
<td>98.20 ± 0.610</td>
<td>5.32 ± 0.030</td>
</tr>
<tr>
<td>F5</td>
<td>97.28 ± 0.586</td>
<td>3.96 ± 0.024</td>
</tr>
<tr>
<td>F6</td>
<td>97.18 ± 0.875</td>
<td>3.52 ± 0.024</td>
</tr>
</tbody>
</table>

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.

REFERENCES


