

## **BAB 5**

### **KESIMPULAN DAN ALUR PENELITIAN SELANJUTNYA**

#### **5.1. Kesimpulan**

HPMC merupakan faktor yang berpengaruh dominan terhadap pelepasan dan penetrasi *patch* natrium diklofenak berdasarkan nilai koefisien dalam persamaan. Berdasarkan analisis anava bahwa pengaruh HPMC terhadap pelepasan dan penetrasi *patch* natrium diklofenak adalah bermakna. Asam oleat mempunyai pengaruh yang tinggi dan bermakna terhadap penetrasi meskipun HPMC yang berpengaruh dominan terhadap penetrasi karena besarnya fluks penetrasi tergantung dari besarnya fluks pelepasan.

Formula optimum *patch* diperoleh pada konsentrasi HPMC 7,225 % dan asam oleat 7,9 %, dengan hasil teoritis fluks pelepasan 113.07  $\mu\text{g}/\text{cm}^2 \cdot \text{h}^{-1}$  dan fluks penetrasi 34.38  $\mu\text{g}/\text{cm}^2 \cdot \text{h}^{-1}$ .

#### **5.2. Alur Penelitian Selanjutnya**

Penelitian farmakokinetik dan farmakodinamik formula optimum secara *in vivo*.

## DAFTAR PUSTAKA

Anonim. [No Date]. Voltaren Transdermal Patch. [Online].  
[http://www.shoppillrx.com/d\\_Voltaren-Transdermal-Patch\\_59.aspx](http://www.shoppillrx.com/d_Voltaren-Transdermal-Patch_59.aspx).  
[2010, Agustus 18].

Babu, R. J., M. Singh, and N. Kanikkannan, 2006, Fatty Alcohols and Fatty Acids, in: **Percutaneous Penetration Enhancers**, E. W. Smith and H. I. Maibach (eds.), 2<sup>nd</sup> ed., Taylor and Francis, Newyork, 137-154.

Baldrick, P., 2006, Pharmaceutical Excipient Development - A Preclinical Challenge, in: **Excipient Development for Pharmaceutical, Biotechnology, and Drug Delivery Systems**, A. Katdare and M. V. Chaubal (eds.), Taylor and Francis Group, New York, 23.

Barry, B. W., 1983, **Dermatological Formulation**, Marcel Dekker, New York, 235-250.

Barry, B. W., 2006, Penetration Enhancer Classification, in: **Percutaneous Penetration Enhancers**, E. W. Smith and H. I. Maibach (eds.), 2<sup>nd</sup> ed., Taylor and Francis Group, 3-14.

Barry, B., 2002, Transdermal Drug Delivery, in: **Pharmaceutics The Science of Dosage Form Design**, M. E. Aulton (ed.), 2<sup>nd</sup> ed., Churchill Livingstone, New York, 500-528.

Bolton, S., 1990, **Pharmaceutical Statistic Practical and Clinical Application**, 2<sup>nd</sup> ed., Marcel Dekker, 308-337.

Chandra, A., P. K. Sharma, and R. Irchhiaya, 2009, Effect of Alcohols and Enhancers on Permeation Enhancement of Ketorolac, **Asian J Pharm.**, 3(1), 37-42.

**Farmakope Indonesia III**, 1979, Departemen Kesehatan Republik Indonesia, Jakarta, 15.

Garala, K. C., A. J. Shinde, and P. H. Shah, 2009, Formulation and *In-Vitro* Characterization of Monolithic Matrix Transdermal Systems Using HPMC/Eudragit S 100 Polymer Blends, **International Journal of Pharmacy and Pharmaceutical Sciences**, 1(1), 108-120.

Grams, Y. and J. Bouwstra, 2005, Penetration and Distribution in Human Skin Focusing on The Hair Follicle, in: **Percutaneous Absorption**, R. L. Bronaugh and H. I. Maibach (eds.), 4<sup>th</sup> ed., Taylor and Francis Group, New York, 177-187.

Guy., R. H. and J. Hadgraft , 1989, Selection of Drug Candidates for Transdermal Drug Delivery, in: **Transdermal Drug Delivery Development Issues and Research Initiatives**, J. Hadgraft and R. H. Guy (eds), Marcel Dekker, New York, 61-77.

Jain, A., P. Karande, and S. Mitragotri, 2005, Skin Impedance-Guided High Throughput Screening of Penetration Enhancers: Methods and Applications, in: **Percutaneous Absorption**, R. L. Bronaugh and H. I. Maibach (eds.), 4<sup>th</sup> ed., Taylor and Francis, Newyork, 851-860.

Jamakandi, V. G., J. S. Mulla, B. L. Vinay, and H. N. Shivakumar, 2009, Formulation, Characterization, and Evaluation of Matrix-Type Transdermal Patches of a Model Antihypertensive Drug, **Asian J Pharm.**, 3(1), 59-65.

Kanikkannan, N., R. J. Babu, and M. Singh, 2006, Penetration Enhancer Classification, in: **Percutaneous Penetration Enhancer**, E. W. Smith and H. I. Maibach (eds.), 2<sup>nd</sup> ed., Taylor and Francis Group, 17-29.

Katzung, B. G., 2002, **Farmakologi Dasar dan Klinik**, terjemahan D. Sjabana, E. Isbandiati, A. Basori, M. Soedjak, I. Uno, Ramadhani, dan S. Zakaria, Salemba Medika, Jakarta, 449- 462.

Kleinschmidt, G., 2005, Case Study: Validation of an HPLC-Method for Identity, Assay, and Related Impurities, in: **Method Validation in Pharmaceutical Analysis**, J. Ermer and J. H. H. Miller (eds.), WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 195-212.

Krause, J., S. Mitriaikina, A. Kundratek, J. Klein, and C. C. Müller-Goymann. [No Date]. Characterisation of Patches Containing Different Carbohydrates from Growing Raw Materials for Transdermal Delivery of Diclofenac Sodium. [Online]. <http://www.pharmtech.tu-bs.de/files/muegoy/jkrausejena0602.pdf>. [2010, Agustus 18].

Liu, Y., L. Fang, H. Zheng, L. Zhao, X. Ge, and Z. He, 2007, Development and In Vitro Evaluation of A Topical Use Patch Containing Diclofenac Diethanolamine Salt, **Asian J Pharm. Sci.**, 2(3), 106-113.

Lund, W., 1994, **The Pharmaceutical Codex**, 20<sup>th</sup> ed., The Pharmaceutical Press, London, 835-837.

Mahanani, R. M. A. P., 2009, **Efek Penambahan Berbagai Peningkat Penetrasi Terhadap Penetrasi Terhadap Penetrasi Perkutan Gel Natrium Diklofenak secara In-Vitro**, Skripsi Sarjana, Universitas Muhammadiyah, Surakarta.

Martin, A., J. Swarbrick, A. Cammarata, 2008, **Farmasi Fisik Dasar-Dasar Kimia Fisik dalam Ilmu Farmasetik**, ed. 3, terjemahan Yoshita dan I. A. Baihaki, Penerbit Universitas Indonesia, Jakarta, 827-921.

McEvoy, G. K., 2007, **Drug Information**, American Society of Healthy System Pharmacists, Washington, 1484-1491.

Moffat, A. C., J. V. Jackson, M. S. Moss, and B. Widdop, 1986, **Clarke's Isolation and Identification of Drugs**, 2<sup>nd</sup> ed., The Pharmaceutical Press, London, p 533-534.

Monteiro, N. A. and Riviere, 2006, Structure and Function of Skin, in: **Dermal Absorption Models in Toxicology and Pharmacology**, J. E. Riviere (ed.), Taylor and Francis Group, New York, 12.

Ozguney, I. S., H. Y. Karasulu, G. Kantarci, S. Sozer, T. Guneri, and G. Ertan, 2006, Transdermal Delivery of Diclofenac Sodium Through Rat Skin From Various Formulations, **AAPS Pharm. Sci. Tech.**, 7(4).

Ramirez, M., 2004, Effect of Formulation Variables on Verapamil Hydrochloride Release from Hydrate HPMC Matrices, **Rev. Soc. Quím. Méx.**, 48, 326-331.

Ranade, V. V. and M. A. Hollinger, 2004, Transdermal Drug Delivery, in: **Drug Delivery Systems**, V. V. Ranade and M. A. Hollinger, 2<sup>nd</sup> ed., CRC Press LLC, New York, 211-243.

Rowe, R. C., P. J. Sheskey, and S. C. Owen, 2006, **Handbook of Pharmaceutical Excipients**, 5<sup>th</sup> ed., Pharmaceutical Press, London, 346-349.

Shinde, A. J., K. C. Garala, and H. N. More, 2008, Development and Characterization of Transdermal Therapeutics System of Tramadol Hydrochloride, **Asian J Pharm.**, 2(4), 265-269.

Trommer, H. and R. H. H. Neubert, 2006, Overcoming the Stratum Corneum: the Modulation of Skin Penetration, **Skin Pharmacol Physiol**, 106-121.

Ubaidulla, U., M. V. S. Molugu, K. Ruckmani, F. J. Ahmad, R. K. Khar, 2007, Transdermal Therapeutic System of Carvedilol: Effect of Hydrophilic and Hydrophobic Matrix on *In Vitro* and *In Vivo* Characteristics, **AAPS Pharm. Sci. Tech.**, 8(1).

**United State Pharmacopoeia XXIX**, 2006, The United States Pharmacopeial Convention, Rockville, 3050-3053.

**United State Pharmacopoeia XXVII**, 2005, The United States Pharmacopeial Convention, Rockville, 546-547.

**United State Pharmacopoeia XXX**, 2007, The United States Pharmacopeial Convention, Rockville.

Vecchia, B. E. and A. L. Bunge, 2006, Animal Models: A Comparison of Permeability Coefficients for Excised Skin from Humans and Animals, in: **Dermal Absorption Models in Toxicology and Pharmacology**, J. E. Riviere (ed.), Taylor and Francis Group, New York, 305- 327.

Verma, P. R. P. and A. R. Chandak, 2009, Development of Matrix Controlled Transdermal Delivery Systems of Pentazocine: *In Vitro/In Vivo* Performance, **Acta Pharm.**, 59, 171-186.

Walters, K. A. and K. R. Brain, 2002, Dermatological Formulation and Transdermal System, in: Dermatological and Transdermal Formulations, K. A. Walters (ed.), Marcel Dekker, New York, 330-350.

Wester, R. C. and H. I. Maibach, 1989, In Vivo Animal Models for Percutaneous Absorption, in: **Percutaneous Absorption**, R. L. Bronaugh and H. I. Maibach (eds.), 2<sup>nd</sup> ed., Marcel Dekker, New York, 221.

Williams, A., 2003, **Transdermal and Topical Drug Delivery from Theory to Clinical Practice**, Pharmaceutical Press, London, 35-40, 178-188.

Winek, C. L., W. W. Wahba, C. L. Winek Jr.,and T. W. Balzer, 2001, Winek's Drug & Chemical Blood-Level Data, **Winek's Toxicology Annual**, Fischer Healthcare, 6.

Wuster, D. E., P. W. Taylor, 1965, Dissolution Kinetics of Certain Crystalline Forms of Prednisolone, **J. Pharm. Sci.**, 54(5), 673.

Zhang, J., C. H. Purdon, E. W. Smith, H. I. Maibach, and C. Surber, 2006, Penetration Enhancement by Skin Hydration, in: **Percutaneous Penetration Enhancers**, E. W. Smith and H. I. Maibach (eds.), 2<sup>nd</sup> ed., Taylor and Francis, New York, 67-70.

