

BAB 5

SIMPULAN

5.1. Simpulan

Eudragit RL-100 dan propilen glikol masing-masing memiliki efek yang searah terhadap pelepasan dan penetrasi. Eudragit RL-100, propilen glikol, maupun interaksi antara keduanya dapat meningkatkan fluks pelepasan dan penetrasi propranolol HCl pada *patch* dengan luas 7,065 cm².

Kadar Eudragit RL-100 sebesar 15% dan propilen glikol 10% akan memberikan penetrasi dan pelepasan propranolol HCl yang optimum, yaitu 20,17 µg/mL untuk fluks pelepasan dan 1,89 µg/mL untuk fluks penetrasi.

5.2. Alur Penelitian Selanjutnya

Ditinjau dari perbedaan yang besar antara jumlah konsentrasi propranolol HCl yang terlepas dan yang terpenetrasi, disarankan untuk penelitian formulasi selanjutnya selain menggunakan matriks dan *plasticizer* dalam formula, ditambahkan juga komponen *enhancer* agar dapat meningkatkan jumlah obat yang dipenetrasi.

Dilakukan juga penelitian untuk memvalidasi nilai persamaan yang didapat dengan metode desain faktorial.

DAFTAR PUSTAKA

Addicks, W.J., Weiner, N.D., Curl, R.L. and Flynn, G.L., 1990, **Drug Delivery from Topical Formulation: Theoretical Prediction and Experimental Assessment**. In: Osborne, D.W., & Amman, A.H. (Eds.), Topical Drug Delivery Formulation, volume 42, Marcel Dekker, Inc., New York, 237-241.

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

Aqil, M., A. Ali and Y. Sultana, 2003, Matrix Type Transdermal Drug Delivery System of Metoprolol Tartrate: *In vitro* Characterization, **Acta Pharm**, 119-125.

Aqil, M., A. Ali, A.K. Najmi, Kiran, D., K.K. Pillai and Y. Sultana, 2005, *In vivo* Characterization of Monolithic Matrix Type Transdermal Drug Delivery System Pinacidil Monohydrate: A Technical Note, **AAPS Pharm.Sci.Tech.**, 1-10.

Barry, B. W., 1983, **Dermatological Formulation: Percutaneous Absorption**, Volume 18, Marcel Dekker, Inc., New York, 106-107, 160-161, 234-329.

Bolton, S., 1990, **Pharmaceutical Statistics, Practical and Clinical Application**, Marcel Dekker, New York, 309-319.

Budhathoki, U. and P. Thapa, 2005, Effect of Chemical Enhancers on *In vitro* Release of Salbutamol Sulphate from Transdermal Patches, **Kathmandu University Journal of Sci.**, 1(1), 1-8.

Chien, Y. W., 1992, Transdermal Drug Delivery System in **Novel Drug Delivery System**, Marcel Dekker, New York, 302-304.

Devissaquet, J., and Aiache, J.M., 1993, **Biofarmasi**, ed 2, (Soertri, W., penerjemah). Penerbit Airlangga University Press, Surabaya, 443-483.

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

Gannu, R., V. Kishan, Y. Rao, and Y.V. Vishnu, 2007, Development of Nitrendipine Transdermal Patch: In vitro and Ex vivo Characterization, **Current Drug Delivery**, 69-76.

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

Green, J. M., 1996, Practical Guide to Analytical Methode Validation, **Analytical Chemistry**, volume 23, 305-309.

Harahap, M., 1990. **Penyakit Kulit**, PT. Gramedia, Jakarta, 1-4, 12-15.

Idson, B and Lazarus J., 1994, Semipadat In: Lachman, L., Lieberman, H.A., Kanig, J.L. (Eds.), **Teori dan Praktek Farmasi Industri**, ed. 3, (Suyatmi, S., penerjemah), UI Press, Jakarta, 1091-1100.

Inal, O., Muge, K., N. Ari and T. Baykara, 2008, *In vitro* and *In vivo* Transdermal Studies of Atenolol using Iontophoresis, **Acta Poloniae Pharm.**, 65 (1), 29-36.

Kumar, R., and Philip, A., 2007, Modified Transdermal Tecnologies: Breaking The Barrier of Drug Permeation Via The Skin, Trop. **J. Pharm. Res.**, 6(1), 633-644.

Li, X., and B.R. Jasti, 2006, **Design of Control Release Drug Delivery System**, McGraw-Hill Companies, Inc., USA, 53-54.

Lund, W., 1994, **The Pharmaceutical Codex, Principles Practice of Pharmaceutics**, 12th ed., The Pharmaceutical Press, London, 134-135.

Mallick, A. W. and Smith, R. E., 1982, Topical Drug Delivery System (skin). In: Banker, G. S., and Charmers, R. K.,(eds), **Pharmaceutics and Pharmacy Practice**, J. B. Lippincott Company, Philadelphia, 279-294.

Martin, A., Swarbick, J., Cammarata, A., 1993, **Farmasi Fisik: Dasar-Dasar Farmasi Fisik dalam Ilmu Farmasetik**, edisi Ketiga, jilid kedua, (Yoshita, penerjemah), UI Press, Jakarta, 827-849, 888-896.

Mehdizadeh, A., M. H. Ghahremani, M. R. Rouini, T. Toliyat, 2006, Effects of Pressure Sensitive Adhesive and Chemical Permeation Enhancers on the Permeability of Fentanyl through Excised Rat Skin, **Acta Pharm.**, 219-229.

Moolgard, B., 1993. Synergistic Effect in Percutaneous Enhancement in Walters, **Pharmaceutical Skin Penetration Enhancement**, Hadgraft, J.,(Ed), Marcel Dekker, New York, 229-239.

Murthy, T. E. G. K. and V. Saikishore, 2008, Effect of Casting Solvent and Polymer on Permeability of Propranolol HCl through Membrane-Controlled Transdermal Drug Delivery System, **Indian J. Pharm. Sci.**, 2(2), 86-90.

Nairn, J. G., 1997, Topical Preparation. In: Swarbrick, J., and Boylan, J.C.(Eds), **Encyclopedia of Pharmaceutical Technology**, Volume 15, Marcel Dekker, Inc., New York, 213-235.

Namdeo, A. and N.K. Jain, 2002, Liquid Crystalline Pharmacogel Based Enhanced Transdermal Delivery of Propranolol Hydrochloride, **Int. J. Pharm. Sci.**, 82 , 223-236.

Omray, L. K., A. Gajbhiye, A. J. Khopade, G. P. Agrawal, S. Kohli and S. Patil, 2008, Delivery System of Propranolol, **Indian Journal of Pharmaceutical Science.**, 7 (5), 578-584.

Petunjuk Operasional Penerapan Cara Pembuatan Obat Yang Baik, 2001, Badan Pengawas Obat dan Makanan. Jakarta, 412-429.

R.H, Patel., G.N, Patel., R.B, Patel., and M.M, Patel., 2009, Development of Dual Layers Drugs Delivery for Motion Sickness, **International Journal of PharmTech Research.**, 1(2), 173 – 178.

Rao, P. R., Reddya, M. N., Ramakrishna, S., and Diwana, P. V., 2003, Comparative in vivo Evaluation of Propranolol Hydrochloride After Oral and Transdermal Administration in Rabbits, **Eur J Pharm Biopharm** 56, 81-85.

Reynold, J. E. F., 1982, **Martindale The Extra Pharmacopoeia** 28th ed, Pharmaceutical Press, London, 1335-1336.

Rowe, R.C., P.J. Sheskey, and P.J. Weller (Eds.), 2003, **Handbook of Pharmaceutical Excipients**, 4th ed, Pharmaceutical Press, London, 462-467.

Scheuplein, R. J., 1978, The Skin as a Barrier, Skin Permeation, Skin Variation in Diffusion and Permeability, in: **The Physiology and Pathophysiology of the Skin**, Jarret, A. (Ed.), Academic Press, London, 1693-1731.

Setiawati, A. dan Gan, S., 2007, Penghambat Adrenergik, dalam: Gunawan, S. G., (Ed), **Farmakologi dan Terapi**, edisi V, FK-UI, Jakarta, 89-90.

Tanwar, S. Y., C. S. Chauhan and A. Sharma, 2007, Development and Evaluation of Carvedilol Transdermal Patch, **Acta Pharm.**, 57, 151-159.

Ubaidulla, U., F. J. Ahmad., K. Ruckmani, M. V. S. Reddy and 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) article 2, 1-8.

United State Pharmacopoeia XXVIII, 2005, The United States Pharmacopoeial Convention, Inc., Philadelphia, 546-547.

Vecchia, B. E., and Bunge, A. L., 2006, Animal Model: A Comparison of Permeability Coefficient for Exised Skin Human and Animals, in: **Dermal Absorption Model in Toxicology and Pharmacology**, Riviere, J. E.,(Ed), Taylor and Francis, New York, 305-328.

Vogelpoel, H., Welink, J., Amidon, G. E., H.E., Midha., K.K., Olling, M.,Shah, V. P., and Barends, D. M., 2004, Biowaiver Monographs for Immediate Release Solid Oral Dossage Forms Based on Biopharmaceutics Classification System (BSC) Literature Data: Verapamil Hydrochloride, Propranolol Hydrochloride and Atenolol, **J. Pharm Sci.**, 93(8), 1945-1951.

Walker, R. B. and Smith, E. W., 1995, The Role of Percutaneous Penetration Enhancers, Vol. 18, **Adv. Drug Deliv. Rev.**, 295-301.

William, A., 2003, **Transdermal and Topical Drug Delivery from Theory to Clinical Practise**, Pharmaceutical Press, London, 1-84.

Winek, C. L., Wahba, W. W., Winek, C. L. Jr., and Balzer, T. W., 2001, **Winek's Drug and Chemical Blood-Level Data**, 13.

