

BAB 5

SIMPULAN

5.1. Simpulan

Berdasarkan dari hasil data penelitian yang telah diinterpretasikan, dapat ditarik kesimpulan :

1. Penambahan Propilenglikol dapat mempengaruhi laju pelepasan dan sifat mutu fisik gel rektal yaitu viskositas dan daya sebar. Pengaruh Propilenglikol dalam formula F2, F3, dan F4 menyebabkan peningkatan viskositas dan penurunan daya sebar sediaan gel rektal dibandingkan dengan formula yang tidak mengandung Propilenglikol yaitu F1.
2. Formula yang mengandung propilenglikol dapat mempengaruhi laju pelepasan gel rektal dengan bahan aktif ketoprofen. Fluks yang dihasilkan formula dengan menggunakan propilenglikol lebih besar dibandingkan dengan formula tanpa propilenglikol.

5.2. Saran

Dilakukan penelitian uji penetrasi secara *In Vitro* pada penelitian selanjutnya. Selain itu disarankan untuk menambahkan alkalizing agent sebagai peningkat nilai pH sediaan.

DAFTAR PUSTAKA

- (AMA) American Medical Association. 1991. Drug Evaluations. Ed. Ke-8.
- Abdou.H.M. 1989, Dissolution Bioavailability & Bioequivalence, Pennslyonia, MACK Publishing Company, p.189-202.
- Abu El-Enin, A.S.M., El-Feky, G.S., Formulation and Evaluation of In-situ Gelling Tenoxicam Liquid Suppositories. Journal of Life Medicine 2013; 1(2); 23-32.
- Amnuait, T., Ingkatawronwong, S., Maneenuan, D., Worachotekamjorn, K., 2008. Caffeine topical gel formulation. Original article.
- Anonymous. 2005. Propylene Glycol –Antifreeze Grade. Technical Bulletin 2021-1105. Huntsman Corporation.
- Ansel, H.C. 1989, *Pengantar Bentuk Sediaan Farmasi*. 4th edition. Penerjemah: Farida Ibrahim. Jakarta: Universitas Indonesia.
- Arikumalasari, J., Dewantara, I G.N.A., Wijayanti, N P.A.D. 2013. Optimasi HPMC Sebagai Gelling Agent Dalam Formula Gel Ekstrak Kulit Buah Manggis (*Garcinia mangostana* L). 145-149.
- Arlander, E., Cederlund, T and Mar, K. 2003, No volume effect on retrograde colonic spread of rectally-administrated ropivacaine gel. Aliment. Pharm. Therap.18: 655-658.
- Asmara, A., Daili, S.F., Noegrohowati, T., Zubaedah, I., 2012. *Vehikulum Dalam Dermatoterapi Topikal*, Vol.39 : 25-35 .
- Barry, W., 1983, Dermatological Formulations, Percutaneous Absorption, Marcel Dekker Inc.,New York, 300-304
- Bodek, K.H. 2001, Evaluation of Microcrystalline Chitosan Properties As A Drug Carrier. Part II. The Influence of Microcrystalline Chitosan on Release Rate of Ketoprofen, Acta Poloniae Pharmaceutica-Drug Release, 58(3):185-194.
- Boylan, J., C., Copper, Zak, T., 1994, Handbook of Pharmaceutical Excipient, 2nd edition, Washington: American Pharmaceutical Association, 1994: 71-73, 176-179, 310-313
- Committee for Human Medicinal Products (CHMP)., 2014. Background review for the excipient propylene glycol. European Medicines Agency.

- Dabbagh, M.A., Ameri, A and Honarmand, M. 2007, Preparation of Diazepam Rectal Gel Using Cellulose Polymers, *Jundishapur Journal of Natural Pharmaceutical Products*, **2(1)**: 34-44.
- Depkes R.I. 2014, *Farmakope Indonesia V*. Penerbit Dirjen POM, Jakarta.
- Depkes R.I., 2008. *Daftar Obat Esensial Nasional*. Jakarta: Direktorat Jendral Bina Kefarmasian dan Alat Kesehatan. 16.
- Dirjen Badan POM. 1995. *Farmakope Indonesia*. Ed ke-4. Jakarta: Departemen Kesehatan Republik Indonesia. 7-8
- Dixit, M., Kulkarni, P.K., and Vaghela, R.S., Effect of Different Crystallization Techniques on the Dissolution Behavior of Ketoprofen, *Tropical Journal of Pharmaceutical Reseachr*. Benin. 12(3). 317-322.
- Djuanda., 2009. MIMS Pentunjuk Konsultasi. Edisi 8. Indonesia: Edisi Indonesia.
- Ewing, G., 2010. The Topical/Trandermal Ad Hoc Advisory Panel for the USP Performance Tests of Topical and Transdermal Dosage Form, *Pharmacopeial Convention*.12-24.
- Field, A. 2000, *Discovering Statistics using SPSS for windows*. SAGE. London.
- Garg, A., Aggarwal, D., Garg, S., Singla, A.k., 2002. Spreading of Semisolid Formulation, *Pharmaceutical Technology*. Panjab University, Chandigarh. India. 84-100.
- Ghorab, M., Nassar, A., Khafagy, E., Gad, S., 2015. A Pharmaceutical Study Of Various Additives On Itraconazole As Solubilized Systems For Ocular Delivery, *World Journal of Pharmaceutical Research*, Vol 4, Issue 10.
- Goodman and Gilman's. 2007, *Dasar Farmakologi Terapi* . 10thed, vol.1, Diterjemahkan dari Bahasa Inggris oleh sekolah farmasi ITB, EGC, Jakarta.p.692
- Harmita. 2004. Petunjuk Pelaksana Validasi Metode dan Cara Perhitungannya, *Majalah Ilmu Farmasi*, Vol 1(3): 117-135.
- Hasyim, N., Pare, K.L., Junaid, I., dan Kurniati , A., 2012. Formulasi dan Uji Efektivitas Gel Luka Bakar Ekstrak Daun Cocor Bebek (*Kalanchoe pinnata L.*) pada Kelinci, *Majalah Farmasi dan Farmakologi*. Makasar. 16(2). 89-94.

- Heyneman, C. A., Lawless-Liday, C., Wall, G. C., 2000. Oral versus dermal NSAIDs in rheumatic diseases. *Drugs*, Vol. 60, No. 3, pp. 555–574.
- Hinz, B. and Brune, K., 2008. Can drug removals involving cyclooxygenase-2 inhibitors be avoided? A plea for human pharmacology. *Trends Pharmacol Sci*, Vol. 29, No.8, pp. 391-397.
- Huber, L., 2007, *Validation and Qualification in Analytical Laboratories*, 2th Ed., Informa Healthcare, New York.
- Imami, S., 2015. Formulasi Sediaan Gel Rektal Ketoprofen dengan Peningkat Kelekatkan Tween 80. Surabaya.
- Katzung, B. G., 2001. *Farmakologi Dasar dan Klinik*, edisi pertama. Salemba Medika. Jakarta.
- Katzung, B.G., 2007. *Farmakologi Dasar dan Klinik*. Edisi 10. Salemba Medika. Jakarta.
- Kim, N, K., 2005. Anatomic Basis of Sharp Pelvic Dissection for Curative Resection of Rectal Cancer : *Yonsei Medical Journal*. Vol. 46, No. 6, pp. 737 – 749.
- Lachman L., Lieberman H.A., Kanig J.L., 1994. Teori dan Praktek Farmasi Industri diterjemahkan oleh Suyatni S., Edisi II, UI Press, Jakarta. Halaman : 651 - 662.
- Lieberman., Rieger and Banker. 1989. *Pharmaceutical Dosage Form: Disperse System*. Vol ke-2. New York: Marcel Dekker Inc. 495-498
- Lionberger, D. R., and Brennan, M. J., 2010. Dermal nonsteroidal anti-inflammatory drugs for the treatment of pain due to soft tissue injury: diclofenac epolamine dermal patch. *J Pain Res*, Vol. 3, pp. 223-233.
- Madan, J., and Singh, R., 2010. Formulation and Evaluation of Aloe vera Topical Gels, *Int.J.Ph.Sci.*, 2 (2), 551-555.
- Mappa, T., Edy, H.J., Kojong, N., 2013. Formulasi Gel Ekstrak Daun Salam Sasaladahan (*Pepperomia pellucida* L H.B.K) dan Uji Efektivitasnya Terhadap Luka Bakar pada Kelinci, *Jurnal Ilmiah Farmasi*. Manado. 2(2). 49-53.
- Martin, A., Swarbrick, J., dan A. Cammarata. 1993. *Farmasi Fisik* 2. Edisi III. Jakarta: UI Press. Pp. 940-1010, 1162, 1163, 1170.

- Melani, H, D., Purwanti, T., Soeratri, W., 2005. Korelasi Kadar Propilenglikol Dalam Basis Dan Pelepasan Dietilammonium Diklofenak Dari Basis Gel Carbopol ETD 2020. *Majalah Farmasi Airlangga*, Vol.5 No.1.
- Moore, RA, Tramer, MR, Carroll, D, Wiffen, PJ, McQuay, HJ. Quantitative systematic review of topically, applied non-steroidal anti-inflammatory drugs, *Br Med J* 316: 333-338, 1998.
- Muranishi S. 1984, Characteristics of drug absorption via the rectal route. *Methods Find. Exp. Clin. Pharmacol.* 6:763-772.
- Mycek, M.J., Harvey, R.A., Champe C. C., 2001. Farmakologi Ulasan Bergambar. Lippincott's illustrated reviews: Farmacology. Penerjemah Azwar Agoes. Edisi Kedua. Jakarta: Penerbit Widya Medika. Halaman 411-412.
- Noviza, D., Febriyanti, N., and Umar, S., 2015. Solubilisasi Parasetamol Dengan Ryoto® Sugar Ester dan Propilenglikol. *Jurnal Sains Farmasi & Klinis* (ISSN: 2407-7062) | Vol. 01 No. 02.
- Nurdianti, L., 2015. *Formulasi dan Evaluasi Gel Ibuprofen dengan Menggunakan Viscolam Sebagai Gelling Agent*, Vol.4.
- Perhimpunan Reumatologi Indonesia (IRA)., 2014. Penggunaan Obat Abni Inflamasi Non Steroid. Jakarta. 2-14.
- PermeaGear Franz Cell, 2005. Diakses pada 23 Maret 2016. <http://www.permeagear.com/franz.htm>.
- Ping, N.H., Lim, C, Eviria, Theresia, M dan Amiths, M. (eds 14). 2015, MIMS Petunjuk Konsultasi, BIP, Indonesia.
- Prasanna, L., Deepthi, B and Rao, R. 2012, Review Article Rectal drug delivery: A promising route for enhancing drug absorption, *Asian J. Res. Pharm. Sci.* 2(4): 143-149. Rencher, S., Karavana, S.Y., and Ozyazici, M., 2009. Bioavailability File: Ketoprofen, *Journal Pharmaceutical Science*. Bornova, Izmir. 34. 203-216.
- Rahmawanty, D., 2014. Formulasi Gel Menggunakan Serbuk Daging Ikan Haruan (*Channa striatus*) Sebagai Penyembuh Luka, *Media Farmasi*. Jakarta. **11(1)**. 29-40.
- Rasool, B. K. A., Abu-Gharbieh, E. F., Fahmy, S. A., Saad, H. S., and Khan, S. A., 2010. Development and Evaluation of Ibuprofen Transdermal Gel Formulation. *Tropical Journal of Pharmaceutical Research* August. 9 (4) : 355-363.

- Reynold. J.E.F. 1993, Martindale : The Extra Pharmacopeia.: The Pharmaceutical Press, London.
- Rowe, R. C., P. J. Sheskey, dan M. E. Quinn. 2009. Handbook of Pharmaceutical Excipients. Sixth Edition. USA: Pharmaceutical Press. Pp. 326-329; 441-444; 592-594; 596-598.
- Sahu Jagdish K., Banerjee Lopamudra. 2010, *Evaluation of Ulcerogenicity of Ketoprofen Glucopyrano Side Derivatives*. IJRAP. 1 (1) 186 - 191
- Setty, C.M., Babubhai, S.R and Pathan, I.B. 2010, Development of Valdecosib Topical Gels: Effect of Formulation Variables on the Release of Valdecosib, *International Journal of Pharmacy and Pharmaceutical Sciences*, **2(1)**:70-73.
- Shargel, L., Yu, A., and Wu, S. 2005, Biofarmasetika dan Farmakokinetika Terapan, Edisi kedua, Airlangga University Press, Surabaya. 167 – 187.
- Sheng, J.J., Kasim, N.A., Chandrasekharan, R., Amidon, G.L. 2006, Solubilization and Dissolution of Insoluble Weak Acid, Ketoprofen: Effect of pH Combined Surfactant, *Eur J Pharm Sci* 29: 306-314,
- Shojaei, A.H., 1998, Buccal Mucosa As A Route For Systemic Drug Delivery: A Review, *J Pharm Pharmaceut Sci*, 1(1), 22.
- Siang, R., Teo, S.Y., Lee, S.Y., Basavaraj, A.K., Koh, R.Y., Rathbone, M.J., 2014. Formulation And Evaluation Of Topical Pentoxifylline-Hydroxypropil Methylcellulose Gels For Wound Healing Application, *Int J Pharm Pharm Sci*, Vol 6, Issue 9, 535-539.
- Siswandono dan Soekardjo, B. 2011, Kimia Medisinal edisi I, Airlangga University Press, Surabaya.
- Sulaiman, T.N. dan Kuswahyuning, R. 2008, Teknologi dan Formulasi Sediaan Sediaan Semipadat, Pustaka Laboratorium Teknologi Farmasi, Fakultas Farmasi Universitas Gadjah Mada, Yogyakarta.
- Swarbrick, J. and Boylan J. C. 1995, Encyclopedia of Pharmaceutical Technology, vol. I, Marcel Dekker Inc., New York, 3.
- Sweetman, S.C. 2009. Martindale 36 The Complete Drug Reference. London: The Pharmaceutical Press.

- Thakker, K. D., and Wendy H. Chem. 2003. Development and Validation of in vitro release tests for semisolid dosage forms case study. In: Dissolution Technologies.
- Tirunagari, M., Mehveen, N., Qureshi, M.F., Sultana, J.P., and Tirunagari, V. 2012, Solubility enhancement of flurbiprofen using different solubilization techniques. International Journal of Pharmacy and Pharmaceutical Science.
- Tjay, T. H., dan Rahardja, K. 2007. Obat-Obat Penting. Edisi Kelima. Jakarta: Gramedia.
- Voigt, R., 1994. Buku Pelajaran Teknologi Farmasi. Penerjemah Dr. Soendani Noerono. Edisi Kelima. Gadjah Mada University Press, Yogyakarta. Halaman : 165, 179, 222.
- Wade, A., and Paul. J. W., 1994. Handbook of Pharmaceutical Recipients, second edition, American Pharmaceutical Association, Washington.
- Watson, D.G. 2005. *Pharmaceutical Analysis*, Elsevier's Health Sciences Rights, Philadelphia, USA.
- Winek, C.L., Wagdy, W.W., Balzer, T.W., 2001. Winek's Drug and Chemical Blood-Level Data.
- Yalkowsky, S.H., 1981. Techniques of Solubilization of Drugs, 12-13; 135-157, Marcel Dekker Inc., New York
- Zopf, L. C., and Blang, S. M., 1974. Semi Solid Dosage Forms, Ointment, Creams and Paste, dalam Dittert, L. W, Sprowl's American Pharmacy and Introduction to Pharmaceutical Techniques and Dosage Forms, Edisi VII, J. B. Lippincott Company, Philadelphia, Toronto.