

BAB 7

KESIMPULAN DAN SARAN

7.1 Kesimpulan

Berdasarkan hasil penelitian yang telah dilakukan dapat disimpulkan bahwa :

1. *Curcuminoid* dengan nanopartikel silika berpotensi bakteriostatik terhadap bakteri *Klebsiella pneumonia*.
2. Berdasarkan hasil uji mikrodilusi menentukan nilai KHM menggunakan spektrofotometri dengan nilai OD didapatkan nilai KHM *Curcuminoid* dengan nanopartikel silika terhadap bakteri *Klebsiella pneumonia* pada konsentrasi 2X(32.000 µg/mL) dan 4X (64.000 µg/mL).

7.2 Saran

Berdasarkan hasil penelitian yang telah dilakukan dapat disarankan bahwa :

1. Penggunaan *tween* sebagai pelarut dari *Curcuminoid* dengan nanopartikel silika ditingkatkan agar lebih mudah melarutkan.

2. Melakukan penelitian di tempat tertutup termasuk pada saat melakukan pengambilan *Curcuminoid* dengan nanopartikel silika menggunakan mikropipet
3. Menggunakan ukuran pori yang berbeda dan memiliki kesamaan ukuran pori pada nanopartikel silika
4. Menjaga suhu penyimpanan *Curcuminoid* dengan nanopartikel silika pada suhu ruangan yang benar-benar diatur.
5. Menggunakan metode pembuatan nanopartikel silika yang lain.

DAFTAR PUSTAKA

1. Priyanto. farmakologi dasar untuk mahasiswa keperawatan dan farmasi edisi 2. 2nd ed. jakarta: leskonfi; 2008.
2. Katz MH. HIV Infection and AIDS. CURRENT Medical Diagnosis & Treatment 2017. 2017. 1330-1362 p.
3. kemenkes RI. profil kesehatan indonesia [Internet]. 2015 [cited 2018 Mar 1]. Available from:
<http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/profil-kesehatan-Indonesia-2015.pdf>
4. Green j, Rianto S. Terapi Herbal Pengobatan Alami Mengatasi Bakteri. jakarta: prestasi pusaka; 2005. 18-27 p.
5. Hogg S. Essential Microbiology. Viruses. 2005;260.
6. Awang DVC. Valerian. Tyler's Herbs Choice Ther Use Phytomedicinals. 2009;117-8.
7. Besinis A, Peralta T De, Handy RD. The antibacterial effects of silver, titanium dioxide and silica dioxide nanoparticles compared to the dental disinfectant chlorhexidine on Streptococcus mutans using a suite of bioassays. nanotoxicology [Internet]. 2014; Available from:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3878355/>
8. Kandi V, Kandi S. Antimicrobial properties of

nanomolecules : potential candidates as antibiotics in the era of multi-drug resistance Antimicrobial properties of nanomolecules : potential candidates as antibiotics in the era of multi-drug resistance. 2015;(April).

9. Adisasmito AW, Tumbelaka AR. Penggunaan Antibiotik Khususnya pada Infeksi Bakteri Gram Negatif di ICU Anak RSAB Harapan Kita. *Sari Pediatr.* 2006;8(2):127–34.
10. Mutiah R. EVIDENCE BASED KURKUMIN DARI TANAMAN KUNYIT (*Curcuma longa*) SEBAGAI TERAPI KANKER PADA PENGOBATAN MODERN. *antikanker* [Internet]. 2015;1(97):14. Available from: <http://repository.uin-malang.ac.id/1832/3/1832.pdf>
11. M.Hetrick E, HoShin J, S.Paul H, H.Schoenfisch M. Anti-biofilm efficacy of nitric oxide-releasing silica nanoparticles. *biomaterial* [Internet]. 2009; Available from: <https://www.sciencedirect.com/science/article/pii/S0142961209001148>
12. Yance DR. *Adaptogens in Medical Herbalism* [Internet]. Rochester: Healing Arts Press; 2013. 651 p. Available from: www.HealingArtsPress.com
13. (Internet). No Title [Internet]. [cited 2018 Mar 18]. Available

from: <https://uvicepermaculture.wordpress.com/permaculture-plants/nutritious-and-delicious-turmeric-the-wonder-plant/>

14. Lester Packer, Ph.D. Enrique Cadenas, M.D. PD. HERBAL MEDICINE BIOMOLECULAR AND CLINICAL ASPECT. second. california; 2011.
15. Rhizoma CLL. Assessment Report on Curcuma Longa L. Rhizoma. Eur Med Agency Eval Med Hum Use London,. 2010;(November 2009).
16. Yulianti Y. Uji Efektivitas Ekstrak Kunyit sebagai Antibakteri dalam Pertumbuhan Bacillus sp dan Shigella dysenteriae secara In vitro. J Profesi Med. 2016;10(1):26–32.
17. Drugs H, Medicine M. No Title.
18. Campbell S, Landry ML. Rapid antigen tests. Advanced Techniques in Diagnostic Microbiology. 2014. 31-51 p.
19. Mukhriani. Ekstraksi, pemisahan senyawa, dan identifikasi senyawa aktif. J Kesehat. 2014;VII(2):361–7.
20. KURNIA A. PENJELASAN MENGENAI PERATURAN MENTRI KESEHATAN REPUBLIK INDONESIA NOMOR 1109/MENKES/PER/IX/2007. PENYELENGGARAAN PENGOBATAN KOMPLEMENTER-ALTERNATIF DI FASILITAS

PELAYANAN Kesehatan. 2011;

21. Hunn E. Taxonomic Hierarchy [Internet]. 2005 [cited 2018 Mar 18]. Available from:
https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=9749#null
22. Brisse S, Grimont F, Grimont P a D. The Genus *Klebsiella* Taxonomic History and Structure. *The Prokaryotes*. 2006;159–96.
23. Carroll KC. Mikrobiologi Kedokteran Jawetz, Melnick, & Adelberg. 27 th ed.
24. Bhatia R, Ichhpujani RL. Essentials of Medical Microbiology. Vol. 53, Jaypee. 2008. 1689-1699 p.
25. Bailey & scoots. bailey and scoots diagnosis microbiology ed 13. 13th ed. 3251 Riverport Lane St. Louis, Missouri 63043; 2014. 228-262 p.
26. Agar MC. Mac Conkey [Internet]. Laboratorios Britania. p. 1–2. Available from: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSTInXCrshAkeNLTh43Ev3vFE-CnxALg9zURTr_D83rBLAtTSYI
27. leboffe J M, Pierce burton e. A Phortography atlas for microbiology laboratory for the 4th edition. 4th ed. united

states of america: Morton Publishing Company;

28. tes semua klebsiella [Internet]. Available from:
https://www.google.co.id/imgres?imgurl=https://scontent-sea1-1.cdninstagram.com/vp/fdd5ae7c0d46eac5374744cef87b9f75/5B433818/t51.2885-15/e35/12141910_899601106784960_781234988_n.jpg?ig_cache_key%3DMTA4OTE1NDQxMDkxNTEzMDY1MQ%253D%253D.2&imgrefurl=http://ww
29. tes motil klebsiella [Internet]. Available from:
https://www.google.co.id/imgres?imgurl=https://scontent-sea1-1.cdninstagram.com/vp/fdd5ae7c0d46eac5374744cef87b9f75/5B433818/t51.2885-15/e35/12141910_899601106784960_781234988_n.jpg?ig_cache_key%3DMTA4OTE1NDQxMDkxNTEzMDY1MQ%253D%253D.2&imgrefurl=http://ww
30. enterobacteriaceae gambar tes [Internet]. Available from:
<https://www.google.co.id/imgres?imgurl=https://image.slidesharecdn.com/enterobacteriaceae-130912024217-phpapp01/95/enterobacteriaceae-45->

638.jpg?cb%3D1378953861&imgrefurl=https://www.slideshare.net/babasahebkhumbhar/enterobacteriaceae-26124036&h=479&w=638&

31. klebsiella mr vp [Internet]. Available from:
<https://www.google.co.id/imgres?imgurl=https://image.slidesharecdn.com/enterobacteriaceae-130912024217-phpapp01/95/enterobacteriaceae-46-638.jpg?cb%3D1378953861&imgrefurl=https://www.slideshare.net/babasahebkhumbhar/enterobacteriaceae-26124036&h=479&w=638&>
32. Podschun R, Ullmann U, Ullmann U. Klebsiella spp . as Nosocomial Pathogens : Epidemiology , Taxonomy , Typing Methods , and Pathogenicity Factors Klebsiella spp . as Nosocomial Pathogens : Epidemiology , Taxonomy , Typing Methods , and Pathogenicity Factors. 1998;11(4):589–603.
33. Kasper D, Fauci A, Hauser S, Longo D, Jameson JL, Loscalzo J. Harrison, Principles of Intern Medicine. 19Th Ed. 2015;2559.
34. Park SO, Liu J, Furuya EY, Larson EL. Carbapenem-Resistant *Klebsiella pneumoniae* Infection in Three New York City Hospitals Trended Downwards From 2006 to

2014. *Open Forum Infect Dis* [Internet]. 2016;3(4):ofw222.
Available from: <https://academic.oup.com/ofid/article-lookup/doi/10.1093/ofid/ofw222>
35. Paczosa MK. *Klebsiella pneumoniae* : Going on the Offense with a Strong Defense. 2016;80(3):629–61.
36. R.Alan H. Antibiotics basics for clinicians the ABCs of choosing the right antibacterial agent. *Antibiotics basics for clinicians the ABCs of choosing the right antibacterial agent*. 2013. 182 p.
37. Bharti C, Gulati N, Nagaich U, Pal A. Mesoporous silica nanoparticles in target drug delivery system: A review. *Int J Pharm Investig* [Internet]. 2015;5(3):124. Available from: <http://www.jpionline.org/text.asp?2015/5/3/124/160844>
38. Sulastri S, Kristianingrum S. Berbagai Macam Senyawa Silika : Sintesis, Karakterisasi dan Pemanfaatan. *Pros Semin Nas Penelitian, Pendidik dan Penerapan MIPA*. 2010;211–6.
39. Fadhlulloh M a, Rahman T, Nandiyanto ABD. REVIEW TENTANG SINTESIS SiO₂ NANOPARTIKEL 1 Program Studi Kimia , Jurusan Pendidikan Kimia , Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam , Universitas Pendidikan Indonesia , Jl . Dr . Setiabudi no 229

- , Bandung 40154 , Jawa Barat , Indonesia. 2014;5(1):30–45.
40. Budiharti G. Sintesis Nanopartikel Silika Menggunakan Metode Sol-Gel Synthesis Of Silica Nanoparticles With Sol-Gel Method Galuh. *J Inov Fis Indones*. 2015;04(03):22–5.
 41. Application of Nanotechnology in Medicine : A View. 2013;(May 2014).
 42. Arya V, Komal R, Kaur M, Goyal A. Silver anoparticles as a Potent Antimicrobial Agent: A Review. *Pharmacologyonline*. 2011;3(May):118–24.
 43. Shahbazi M, Herranz B, Santos HA. Nanostructured porous Si-based nanoparticles for targeted drug delivery. 2012;(December):1–17.
 44. Camporotondia DE, Fogliaa ML, Alvareza GS, Meberta AM, Diaza LE, Coradinb T, et al. Antimicrobial properties of silica modified nanoparticles. *Microb Pathog Strateg Combat them Sci Technol Educ*. 2013;(June 2014):283–90.
 45. Shen L, Guo A, Zhu X. Tween surfactants: Adsorption, self-organization, and protein resistance. *Surf Sci [Internet]*. 2011;605(5–6):494–9. Available from: <http://dx.doi.org/10.1016/j.susc.2010.12.005>
 46. Information P. Tween ® (Polysorbate) 20 & 80, oxidant-

- free. :2–3.
47. Nuhan FA. Skrining antibakteri kombinasi ekstrak etanol temulawak, meniran, kemukus dan beluntas terhadap staphylococcus Aureus, Escherichia coli dan Salmonella Typhi. 2015;11–38.
 48. Kusumaningtyas E. Sensitivitas Metode Bioautografi Kontak dan Agar Overlay dalam Penentuan Senyawa Antikapang. J Ilmu Kefarmasian Indones. 2008;6(2):75–9.
 49. Niamsa N, Sittiwet C. Antibacterial Activity of Curcuma longa Aqueous extract. Journal of Pharmacology and Toxicology. 2009. p. 1–5.
 50. Res Q, Res Q, Antiq A. Supporting Information. 2005;1–6.
 51. Han Y, Ying JY. Generalized fluorocarbon-surfactant-mediated synthesis of nanoparticles with various mesoporous structures. Angew Chemie - Int Ed. 2004;44(2):288–92.
 52. Croda Europe Ltd Cowick Hall. Span and Tween. 2010;44(0):6–11. Available from: www.croda.com
 53. Basniwal RK, Buttar HS, Jain VK, Jain N. Curcumin Nanoparticles : Preparation , Characterization , and Antimicrobial Study. 2011;2056–61.
 54. Tyagi S, Farooqi JA. Curcumin nanoformulations as

- potential antimicrobial agent. 2017;5(5):378–9.
55. Zorofchian Moghadamtousi S, Abdul Kadir H, Hassandarvish P, Tajik H, Abubakar S, Zandi K. A review on antibacterial, antiviral, and antifungal activity of curcumin. *Biomed Res Int*. 2014;2014.
56. Hartono SB, Hadisoewignyo L, Yang Y, Meka AK, Antaresti, Yu C. Amine functionalized cubic mesoporous silica nanoparticles as an oral delivery system for curcumin bioavailability enhancement. *Nanotechnology* [Internet]. 2016;27(50):1–7. Available from: <http://dx.doi.org/10.1088/0957-4484/27/50/505605>
57. Testing S. M100-S25 Performance Standards for Antimicrobial. 2015.
58. Kharat M, Du Z, Zhang G, McClements DJ. Physical and Chemical Stability of Curcumin in Aqueous Solutions and Emulsions: Impact of pH, Temperature, and Molecular Environment. 2017;