

DAFTAR PUSTAKA

- Abdulbaqi, H.R., Himratul-Aznita, W.H., Baharuddin, N.A. 2016. Anti-plaque effect of a synergistic combination of green tea and *Salvadora persica* L. against primary colonizers of dental plaque. *Elsevier*. 70: 117–124.
- Agustina, S., Swantara, I.M.D. Smartha, I.N. 2015. Isolasi kitin, karakterisasi, dan sintesis kitosan dari kulit udang. *Jurnal Kimia*. 9(2): 271–278.
- Alahakoon, A.U., Jayasena, D.D., Jung, S., Kim, H.J., Kim, S.H., Jo, C. 2014. Antimicrobial effect of calcium chloride alone and combined with lactic acid injected into chicken breast meat. *Korean Journal for Food Science of Animal Resources*. 34(2): 221-229.
- Alhuur, K.R.G., Juniadi, E.M., Suradi, K. 2020. Efektifitas kitosan sebagai edible coating karkas ayam broiler. *Jurnal Teknologi Hasil Peternakan*. 1(1):17-24
- Aliasghari, A., Khorasgani, M.R., Vaezifar, F., Rahimi, F., Yaounesi, H., Khoroushi, M. 2016. Evaluation of antibacterial efficiency of chitosan and chitosan nanoparticles on cariogenic streptococci: An in vitro study. *Iranian Journal of Microbiology*. 8(2): 93-100.
- Amtha, R., Marcia, M., Aninda, A.I. 2017. Plester sariawan efektif dalam mempercepat penyembuhan stomatitis aftosa rekuren dan ulkus traumatikus. *Majalah Kedokteran Gigi Indonesia*. 3(2): 69-75.
- Anitha, A., Rani, V.V.D., Krishna, R., Sreeja, V., Selvamurugan, N., Nair, S.V., Tamura, H., Jayakumar, R. 2009. Synthesis, characterization, cytotoxicity and antibacterial studies of chitosan, O -carboxymethyl and N, O -carboxymethyl chitosan nanoparticles. *Carbohydrate Polymers*. 78(4): 672–677.
- Ardean, C., Davidescu, C.M., Nemes, N.S., Negrea, A., Ciopec, M., Duteanu, N., Negra, P., Duda-Seiman, D., Musta, V. 2021. Factors influencing the antibacterial activity of chitosan and chitosan modified by functionalization. *International Journal of Molecular Science*. 22: 1-28.
- Arjuna, A., Pratama, W.S., Sartini, Mufidah. Uji pendahuluan anti-biofilm ekstrak teh hijau dan teh hitam pada *Streptococcus mutans* melalui metode microtiter plate. *Jurnal Farmasi Galenika (Galenika Journal of Pharmacy)*. 4(1): 44-49.
- Arsyemelati, Iskandar, D. 2015. Sintesis kitosan suksinat dari kitosan dan suksinat anhidrid serta karakteristiknya. *Jurnal Teknologi Technoscientia*. 7(2): 118–127.
- Aziz, N., Gufran, M.F.F.B., Pitoyo, W.U., Suhandi. 2017. Pemanfaatan ekstrak kitosan dari limbah sisik ikan bandeng di selat Makassar pada pembuatan

- bioplastik ramah lingkungan. *Systematic Reviews in Pharmacy*. 1(1): 56–61.
- Badan Standardisasi Nasional. 2013. *Kitosan - Syarat Mutu dan Pengolahan*. SNI 7949 - 2013. Jakarta.
- Bai, X., Kong, M., Xia, G., Bi, S., Zhou, Z., Cheng, X., Chen X. 2017. Systematic investigation of fabrication conditions of nanocarrier based on carboxymethyl chitosan for sustained release of insulin. *International Journal of Biological Macromolecules*. 102: 468-474
- Balitbangkes. 2013. *Hasil Utama RISKESDAS 2013*. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
- Balitbangkes. 2018. *Hasil Utama RISKESDAS 2018*. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
- Bangngalino, H., Akbar, A. 2017. Pemanfaatan sisik ikan bandeng sebagai bahan baku kitosan dengan metode sonikasi dan aplikasinya untuk pengawet makanan. *Prosiding Seminar Hasil Penelitian SNP2M*. 105–108.
- Bankvall, M., Gale, F.S.G., Wold, A., Jontell, M., Ostman, S. 2014. The oral microbiota of patients with recurrent aphthous stomatitis. *Journal of Oral Microbiology*. 6: 1–11.
- Bathla, S. 2017. *Textbook of Periodontics*. 1st Ed. Jaypee Brothers Medical Publisher. New Delhi.
- Bin, Z., Madeod, L.C., Kitten, T., Xu, P. 2018. *Streptococcus sanguinis* biofilm formation & interaction with oral pathogens. *Future Microbiology*. 13(8): 915–932.
- Chaiwarit, T., Sommano, S.R., Rachtanapun, P., Kantrong, N., Ruksiriwanich, W., Kumpugdee-Vollrath, M., Jantrawut, P. 2022. Development of carboxymethyl chitosan nanoparticles prepared by ultrasound-assisted technique for a clindamycin HCl carries. *Polymers*. 14(9).
- Chaiwong, N., Leelapornpisid, P., Jntanasakulwong, K., Rachtanapun, P., Seesuriyachan, P., Sakdatorn, V., Leksawasdi, N., Phimolsiripol, Y. 2020. Antioxidant and moisturizing properties of carboxymethyl chitosan with different molecular weights. *Polymers*. 12: 1-14.
- Chalmers, N.I., Palmer, R.J., Cisar, J.O., Kolenbrander, P.E. 2008. Characterization of a *Streptococcus sp.* - *Veillonella sp.* community micromanipulated from dental plaque. *Journal of Bacteriology*. 190(24): 8145-8154.
- Coffey, B.M., Anderson, G.G. 2014. Biofilm formation in the 96-well microtiter plate. *Pseudomonas Methods and Protocols*. 1149: 631–641.
- Damayanti, W., Rochima, E., Hasan, Z. 2016. Aplikasi kitosan sebagai antibakteri pada fillet patin selama penyimpanan suhu rendah. *Jurnal Pengolahan Hasil*

Perikanan Indonesia. 19(3): 321–328.

Diaz-Montez, E., Castro-Munoz, R. 2021. Trends in chitosan as a primary biopolymer for functional films and coatings manufacture for food and natural products. *Polymers*. 13(767): 1–24.

Divya, K., Vijayan, S., George, T.K., Jisha, M.S. 2017. Antimicrobial properties of chitosan nanoparticles : Mode of action and factors affecting activity. 18(2): 221–230.

Divya, K., Jisha, M.S. 2018. Chitosan nanoparticles preparation and applications. *Environmental Chemistry Letters*. 16(1): 101–112.

Farag, R.K., Mohamed, R.R. 2013. Synthesis and characterization of carboxymethyl chitosan nanogels for swelling studies and antimicrobial activity. *Molecules*. 18: 190–203.

Fitri, D., Kiromah, N.Z.W., Widiastuti, T. 2019. Formulasi dan karakterisasi nanopartikel ekstrak etanol daun salam (*Syzygium polyanthum*) pada berbagai variasi komposisi kitosan dengan metode gelasi ionik. *JPSCR : Journal of Pharmaceutical Science and Clinical Research*. 1: 61–69.

Egi, M., Soegiharto, G.S., Evacuasiyany, E. 2019. Efek berkumur sari buah tomat (*Solanum lycopersicum L.*) terhadap indeks plak gigi. *Sound of Dentistry*. 3(2): 70–84.

Endriani, R., Rafni, E., Siregar, F.M., Setiawan, R.A., Rasyid, F. 2020. Pola bakteri pada karies gigi pasien diabetes melitus. *Jurnal Kedokteran Gigi Universitas Padjadjaran*. 32(1): 24–40.

Farida, A.N., Husni, A., Puspita, D. 2018. Karboksimetil kitosan memperpanjang daya simpan filet nila merah yang disimpan pada suhu rendah. *Jurnal Teknosains*. 8(2): 135-147.

Ghifari MA, Putri DKT, D.Y. 2020. Pengaruh perendaman larutan kitosan sisik ikan haruan (*Channa striata*) terhadap pelepasan kalsium pada gigi. *Dentin Jurnal Kedokteran Gigi*. 4(3): 111–115.

Gitari, N.M., Bagus, I.G.N., Putra, I. Bagus N. 2017. Potensi nanopartikel alginat-kitosan - ekstrak daun kedondong hutan (*Spondias pinnata (L.f.) Kurz.*) dalam penatalaksanaan tuberkulosis dan multi drug resistance tuberculosis (MDR-TB). *Indonesian Journal of Fundamental Sciences*. 3(2): 135-143.

Goncalves, R.C., da Silva, D.P., Signini, R., Naves, P.L.F. 2017. Inhibition of bacterial biofilms by carboxymethyl chitosan combined with silver, zinc, and copper salts. *International Journal of Biological Macromolecules*. 105: 385-392

Hardi, J., Nurakhirawati, Ridhay, A., Musdalifah. 2017. Sintesis O-karboksimetil kitosan pada berbagai konsentrasi NaOH dan suhu reaksi serta aplikasinya sebagai antibakteri. *Kovalen Jurnal Riset Kimia*. 3(1): 33-40.

- He, J., Bao, Y., Li, J., Qiu, Z., Liu, Y., Zhang, X. 2019. Nanocomplexes of carboxymethyl chitosan/amorphous calcium phosphate reduce oral bacteria adherence and biofilm formation on human enamel surface. *Journal of Dentistry*. 80: 15-22.
- Hernawati, R.D., Triyanto., Murwantoko. 2013. Studi pengaruh karboksimetil kitosan terhadap sistem pertahanan tubuh non-spesifik pada ikan mas (*Cyprinus Carpio*). *Jurnal Sain Veteriner*. 31(1): 66-78.
- Hosaina, H.W., Siagian, Z.A., Florenly, Sim, M. 2020. Uji potensial antibakteri ekstrak daun salam (*Syzygium polyanthum*) - kitosan nanopartikel 1% terhadap pertumbuhan bakteri *Staphylococcus aureus*. *JMKG*. 9(2): 47-56.
- Husni, P., Junaedi, J., Gozali, D. 2020. Potensi kitosan bersumber dari limbah cangkang rajungan (*Portunus pelagicus*) dalam bidang farmasi. *Majalah Farmasetika*. 5(1): 32–38.
- Hutami, W. d., Putri, D.K.T., Carabelly, A.N., Kriswandini, I.L., Pratiwi, A.R., Luthfi, M. 2020. The antibacterial activity of chitosan from haruan (*Channa striata*) fish scale on the growth of *Streptococcus sanguinis*. *Journal of Indonesian Dental Association*. 3(2): 109–114.
- Ihara, Y., Takeshita, T., Kageyama, S., Matsumi, R., Asakawa, M., Shibata, Y., Sugiura, Y., Ishikawa, K., Takahashi, I., Yamashita, Y. 2019. Identification of initial colonizing bacteria in dental plaques from young adults using full-length 16s rRNA gene sequencing. *Clinical Science and Epidemiology*. 4(5): 1–11.
- Ikono, R., Vibriani, A., Wibowo, I., Saputro, K.E., Muliawan, W., Bachtiar, B.M., Mardiyati, E., Bachtiar, E.W., Rochman, N.T., Kagami, H., Xianqi, L., Nagamura-Inoue, T., Tojo, A. 2019. Nanochitosan antimicrobial activity against *Streptococcus mutans* and *Candida albicans* dual-species biofilms. *BMC*. 12: 1-7.
- Jakubovics, N.S., Goodman, S.D., Warren, L.M., Stafford, G.P., Cieplik, F. 2021. The dental plaque biofilm matrix. *Periodontology 2000*. 86(1): 32–56.
- Jali, R.D.A., Putri, D.K.T., Taufiqurrahman, I. 2020. Antibacterial activity of chitosan from haruan (*Channa striata*) fish scales against the growth of *Porphyromonas gingivalis*. *Dentino*. 5(1): 53-57.
- Jubran, A.S., Zeinalabdeen, M.A. and Zwain, M.F. 2021. Broad-spectrum inhibition for biofilm producers in dental decay by dextranase purified from *Lactobacillus fermentum*. *Natural Volatiles & Essential Oils*. 8(4): 3510–3519.
- Joris, L.A., Rieuwpassa, F., Kaya, A.O.W. 2021. Karakteristik fisiko-kimia dan aktivitas antioksidan kitosan yang diproduksi dari sisik ikan kakatua (*Scarus sp.*). *Jurnal Teknologi Hasil Perikanan*. 1(2): 49–58.

- Kalliola, S., Repo, E., Srivastava, V., Heiskanen, J.P., Sirvio, J.A., Liimatainen, H., Sillanpaa, M. 2017. The pH sensitive properties of carboxymethyl chitosan nanoparticles cross-linked with calcium ions. *Elsevier*. 153: 229-236.
- Kalliola, S., Repo, E., Srivastava, V., Zhao, F., Heiskanen, J.P., Sirvio, J.A., Liimatainen, H., Sillanpaa, M. 2018. Carboxymethyl chitosan and its hydrophobically-modified derivative as pH-switchable emulsifier. *Langmuir*. 34(8): 2800-2806.
- Kasuma, N. 2016. *Buku Ajar Plak Gigi*. 1st Ed. Andalas University Press. Padang.
- Ke, C.L., Deng, F.S., Chuang, C.Y., Lin, C.H. 2021. Antimicrobial actions and applications of chitosan. *Polymers*. 13(6): 1-21
- Kurniasih, M., Purwati., Dewi, R.S., Hermawan, D., Vaulina, E. 2019. Carboxymethyl chitosan as a homemade sausage preservative. *Journal of Pure and Applied Chemistry Research*. 8(1): 96-108.
- KKP. 2023. *Total Produksi Udang Tahun 2021*. Jakarta.
- Kurniawaty, E., Putranta, N. 2019. Potensi biopolimer kitosan dalam pengobatan luka. *Medula*. 9(10): 459-464.
- Libba, I.R., Prasetya, F., Putri, N.E. 2019. Pengaruh variasi konsentrasi gelling agent hec dalam sediaan gel sariawan ekstrak daun sirih hitam terhadap sifat fisik gel. *Proceeding of Mulawarman Pharmaceuticals Conferences*. 1(1): 54-60.
- Loekito, L.I., Rizka, Y., Pangabdian, F. 2018. Daya antibakteri kitosan kepingan rajungan (*Portunus pelagicus*) terhadap biofilm *Porphyromonas gingivalis*. *Denta Jurnal Kedokteran Gigi*. 12(2): 82-89.
- Magani, A.K., Tallei, T.E., Kolondam, B.J. 2020. Uji antibakteri nanopartikel kitosan terhadap pertumbuhan bakteri *Staphylococcus aureus* dan *Escherichia coli*. *Jurnal Bios Logos*. 10(1): 7-12.
- Maghfirah, F., Saputri, D., Basri. 2017. Aktivitas pembentukan biofilm *Streptococcus mutans* dan *Candida albicans* setelah dipapar dengan cigarette smoke condensate dan minuman probiotik. *Journal Caninus Dentistry*. 2(1): 12-19.
- Marsh, P.D., Lewis, M.A.O., Rogers, H., William, D.W., Wilson, M. 2016. *Marsh and Martin's Oral microbiology*. 6th Ed. Elsevier. British.
- Matica, M.A., Aashmann, F.L., Tondervik, A., Sletta, H., Ostafe, V. 2019. Chitosan as a wound dressing starting material: Antimicrobial properties and mode of action. *International Journal of Molecular Science*. 20: 1-33.
- Mitchell, J. 2011. *Streptococcus mitis*: Walking the line between commensalism and pathogenesis. *Molecular Oral Biology*. 26(2): 89-98.

- Mourya, V.K., Inamdar, N.N., Tiwari, A. 2010. Carboxymethyl chitosan and its applications. *Advance Materials Letters*. 1(1): 11–33.
- Nasrullah, H., Nababan, Y.I., Yanti, D.H., Hardiantho, D., Nuryati, S., Zairin, M., Ekasari, J., Alimuuddin, A. 2019. Identification and expression analysis of c-type and g-type lysozymes genes after *Aeromonas hydrophila* infection in African catfish. 18(2): 110–119.
- National Center for Biotechnology Information. 2022. Pubchem Compound Summary for CID 9552079, Chlorhexidine. <https://pubchem.ncbi.nlm.nih.gov/compound/Chlorhexidine>, diakses 27 Oktober 2022.
- Ningsih, S.N.R., Tania, E., Azizah, N.N., Lutfiah, S.L., Gunarti, N.S. 2022. Aktivitas antibakteri kitosan dari berbagai jenis bahan baku hewani: Review journal. *Jurnal Buana Farma*. 2(4): 25-30.
- Noor, H.J., Ali, B.G. 2019. Potential Effect of Gold Nanoparticles against *Streptococcus mitis* (Primary Periodontal Colonizer). *Journal of Research in Medical and Dental Science*. 7(6): 7–15.
- Nugrahani, N.A., Kunarti, S., Setyowati, L. 2016. Konsentrasi efektif daya antibiofilm kitosan cangkang udang terhadap *Streptococcus Viridans*. *Conservative Dentistry Journal*. 6(2): 105-109.
- Obaid, Z.M., Ahmed, M.A.A. 2020. Anti-bacterial effects of *Commiphora myrrha* and *Ziziphus spina-christ* leaves extracts against *Streptococcus mitis* (primary colonizer of dental plaque) in vitro study. *Journal of Research in Medical and Dental Science*. 8(3): 57–64.
- Pratiwi, S.U.T., Lagendijk, E.L., De Weert, S., Idrocs, R., Hertiani, T., and Hondel, C.V.D. 2015. Effect of *Cinnamomum burmannii* Nees ex Bl. *Massoia aromatica* Becc. Essential oils on planktonic growth and biofilm formation of *Pseudomonas aeruginosa* and *Staphylococcus aureus* in vitro. *International Journal of Applied Research in Natural Products*. 8(2): 1–13.
- Putranto, R.A. 2019. Periodontal, peran irigasi klorheksidin pada perawatan penyakit. *Jurnal Kedokteran Gigi Terpadu*. 1(1): 35–39.
- Putri, DKT., Ilham, MS., Adhani, R., Utami, JP., Rahmiati. 2022. Activity test of chitosan haruan (*Channa striata*) fish scale as antibiofilm agent against biofilm of *Porphyromonas gingivalis*. *IOP Publishing*. Sci. 976.
- Putri, T., Kania, D. 2020. Synthesis and characteristics of chitosan from haruan (*Channa striata*) fish scale. *Systematics Review in Pharmacy*. 11(4). 15–20.
- Qonitannisa, S., Fadli, A., Sunarno 2020. Sintesis nanokitosan dengan metode gelasi ionik menggunakan pelarut asam asetat dengan variasi konsentrasi kitosan. *Jom FTEKNIK*. 7(2): 1–4.

- Ramadhani, A.A., Firdhausi, N.F. 2021. Potensi limbah sisik ikan sebagai kitosan dalam pembuatan bioplastik. *Jurnal Al Azhar Indonesia Seri Sains dan Teknologi*. 6(2): 90-95.
- Rumengan, I.F.M., Suptijah, P., Salindeho, N., Wullur, S., Luntungan, A.H. 2018. *Nanokitosan dari Sisik Ikan: Aplikasinya Sebagai Pengemas Produk Perikanan*. Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Sam Ratulangi. Manado.
- Samaranayake, L. 2018. *Essential Microbiology for Dentistry*. 5th Ed. Elsevier. Poland.
- Samudra, A.G., Ramadhani, N., Lestari, G., Nugroho, B.H. 2021. Formulasi nanopartikel kitosan ekstrak metanol alga laut coklat (*Sargassum hystrix*) dengan metode gelasi ionik. *Jurnal Ilmiah Manuntung*. 7(1): 92–99.
- Samudra, K.A.G., Soulissam A.G., Widyarman, A.S. 2022. Efikasi antibiofilm kitosan udang windu (*Panenus monodon*) terhadap *Aggregatibacter actinomycetemcomitans* dan *Treponema denticola*. *Journal e-GiGi*. 10(2): 162-167.
- Santoso, S. 2014. *Panduan Lengkap SPSS Versi 20*. Gramedia. Jakarta.
- Sari, I.N., Ningtyas, K.R., Agassi, T.N. 2022. Application chitosan modified carboxymethyl as antibacterial agent of paper packaging. *Alkimia Jurnal Ilmu Kimia dan Terapan*. 2(6): 244-250.
- Sari, R., Widyawaruyanti, A., Anindita F.B.T., Astuti, S.K., Setyawan, D. 2018. Development of andrographolide-carboxymethyl chitosan nanoparticles: Characterization, in vitro release and in vivo antimalaria activity study. *Turk Journal Pharm Sci*. 15(2): 136-141.
- Sartika, I.D. 2016. Isolasi dan karakterisasi kitosan dari cangkang rajungan (*Portunus pelagicus*). *Jurnal Biosains Pascasarjana*. 18(2): 98-112.
- Schlafer, S., Raarup, M.K., Meyer, R.L., Sutherlan, D.S., Dige, I., Nyengaard, J.R., Nyvad, B. 2011. pH landscapes in a novel five-species model of early dental biofilm. *Plos One*. 6(9).
- Setiadhi, R., Sufiawati, I., Zakiawati, D., Nur'aeny, N., Hidayat, W., Firman, D.R. 2017. Inhibition growth of pomegranate seeds extract against *Streptococcus sanguis*: The cause of recurrent aphthous stomatitis. *J Dentomaxillofacial Sci*. 2(1): 7.
- Shariatinia, Z. 2019. Pharmaceutical applications of chitosan. *Advances in Colloid and Interface Science*. 263: 131–194.
- Subekti, A., Ekoningtyas, E.A., Benyamin, B. 2019. Hubungan plak gigi, laju aliran saliva, dan viskositas saliva pada anak usia 6-9 tahun. *Jurnal Kesehatan Gigi*. 6(1): 72-73.

- Suherman, Latif, M., Dewi, S.T.R. 2018. Potensi kitosan kulit udang vannemei (*Litopenaeus vannamei*) sebagai antibakteri terhadap *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, *Propionibacterium agnes*, dan *Eschericia coli* dengan metode difusi cakram kertas. *Media Farmasi*. 14(1): 116-127.
- Sungkar, O.F., Khanza, S., Pangestu, R.A. 2018. Aktivitas antibakteri bedak yang diperkaya dengan konsentrasi ekstrak buah (*Rhizophora mucronata*). *Jurnal Teknologi Pangan*, 2(2): 135–140.
- Tan, Y., Leonhard, M., Moser, D., Scheider-Stickler, B. 2016. Antibiofilm activity of carboxymethyl chitosan on the biofilms of non-Candida albicans Candida spesies. *Carbohydrate Polymers*. 149: 77-82.
- Tan, Y., Leonhard, M., Moser, D., Ma, S., Scheider-Stickler, B. 2016. Inhibition of mixed fungal and bacterial biofilms on silicone by carboxymethyl chitosan. *Colloids and Surfaces B: Biointerfaces*. 148: 193-199.
- Taurina, W., Sari, R., Hafinur, U.C., Wahdaningsih, S., Isnindar. 2017. Optimasi kecepatan dan lama pengadukan terhadap ukuran nanopartikel kitosan-ekstrak etanol 70% kulit jeruk siam (*Citrus nobilis* L.var Microcarpa). *Traditional Medicine Journal*. 22(1): 16-20.
- Tzaneva, D., Simitchiev, A., Petkova, N., Nenov, V., Stoyanova, A., Denev, P. 2017. Synthesis of carboxymethyl chitosan and its rheological behaviour in pharmaceutical and cosmetic emulsions. *Journal of Applied Pharmaceutical Science*. 7(10): 70-78.
- Vaezifar, S., Razavi, S., Golozar, M.A., Karbasi, S., Morshed, M., Kamali, M. 2013. Effects of some parameters on particle size distribution of chitosan nanoparticles prepared by ionic gelation method. *Journal of Cluster Science*. 24(3): 891–903.
- Valm, A.M. 2019. The structure of dental plaque microbial communities in the transition from health to dental caries and periodontal disease. *Journal of Molecular Biology*. 431(16): 2957–2969.
- Waty, S., Suryanto, D., Yurnaliza. 2018. Antibacterial activity of cinnamon ethanol extract (*Cinnamomum burmannii*) and its application as a mouthwash to inhibit streptococcus growth. *IOP Publishing*. 130: (1–8).
- Wedarti, Y.R., Loekito, L., Pangabdian, F., Andriani, D. 2020. Potensi kitosan kepiting rajungan (*Portunus pelagicus*) dalam penghambatan pembentukan biofilm *Porphyromonas gingivalis* dan pertumbuhan *Candida albicans*. 4(2): 121–127.
- Widyaningrum, W., Kania, D.K.T., Taufiqurrahman, I. 2019. Antibacterial activities of chitosan in haruan fish scales (*Channa striata*) to the growth of *Staphylococcus aureus*. *Dentino Jurnal Kedokteran Gigi*. 4(2): 162–167.

Wirasti, Rahmatullah, St., Permadi, Y.W., Agmarina. 2021. Pengujian karakter nanopartikel metode gelasi ionik ekstrak dan tablet daun afrika (*Vernonia amygdalina* Del.). *Jurnal Wiyata*. 8(2): 147–151.

WHO. 2022. *Launch of The Global oral health status report*. World Health Organization. Jenewa, Swiss.

Yuni, U., Istirokhatun, T., Susanto, H. 2015. Pengaruh penambahan nano-ZnO dan nano-Al₂O₃ sebagai agen antibakteri dalam pembuatan membran selulosa asetat-kitosan terhadap biofouling yang disebabkan oleh bakteri gra negatif. *Jurnal Teknik Lingkungan*. 4(4): 1-11.

Zhang, M., Yang, M., Woo, M.W., Li, Y., Han, W., Dang, X. 2021. High-mechanical strength carboxymethyl chitosan-based hydrogel film for antibacterial wound dressing. *Carbohydrate Polymers*.256: 1-9.

Zhou, X. and Li, Y. 2020. *Atlas of Oral Microbiology: From Healthy Microflora to Disease*. 2nd Ed. Zhejiang University Press. Singapore.

