

**PENGARUH PEMBERIAN VARIASI DOSIS TEH HIJAU KOMBUCHA
TERHADAP HITUNG TOTAL JUMLAH DAN JENIS LEUKOSIT
MENCIT (*Mus musculus*)**

SKRIPSI



**UIN SUNAN AMPEL
S U R A B A Y A**

Disusun Oleh :

**ALIYYAH NAFIISAH
NIM: 09040121051**

**PROGRAM STUDI BIOLOGI
FAKULTAS SAINS DAN TEKNOLOGI
UNIVERSITAS ISLAM NEGERI SUNAN AMPEL
SURABAYA
2026**

PERNYATAAN KEASLIAN

Saya yang bertanda tangan di bawah ini,

Nama : Aliyyah Nafiisah

NIM : 09040121051

Program Studi : Biologi

Angkatan : 2021

Menyatakan bahwa saya tidak plagiat dalam penulisan skripsi saya yang berjudul “Pengaruh Pemberian Variasi Dosis Teh Hijau Kombucha Terhadap Hitung Total Jumlah dan Jenis Leukosit Mencit (*Mus musculus*)”. Apabila suatu saat nanti saya melakukan tindakan plagiat, maka saya menerima sanksi yang telah ditetapkan. Demikian pernyataan keaslian ini saya buat dengan sebenar-benarnya.

Surabaya, 07 Januari 2026

Yang menyatakan,



Aliyyah Nafiisah

HALAMAN PERSETUJUAN

Skripsi

Pengaruh Pemberian Variasi Dosis Teh Hijau Kombucha
Terhadap Hitung Total Jumlah dan Jenis Leukosit Mencit (*Mus musculus*)

Diajukan Oleh :

Aliyyah Nafiisah

NIM : 09040121051

Telah diperiksa dan disetujui

Di Surabaya, 07 Januari 2026

Dosen Pembimbing Utama

Dosen Pembimbing Pendamping



Eva Agustina M. Si
NIP. 198908302014032008



Dr. Risa Purnamasari S.Si., M. Si
NIP. 198907192023212031

PENGESAHAN TIM PENGUJI SKRIPSI

Skripsi Aliyyah Nafiisah ini telah dipertahankan di depan tim penguji skripsi di Surabaya, 07 Januari 2026

Mengesahkan,
Dewan Penguji

Penguji I



Eva Agustina, M.Si.
NIP. 198908302014032008

Penguji II



Dr. Risa Purnamasari, S.Si., M.Si.
NIP. 198907192023212031

Penguji III



Irul Hidayati, M.Kes.
NIP. 198102282014032001

Penguji IV



Dr. Romyun Alvy Khoiriyah, M.Si.
NIP. 198306272014032001

Mengetahui,
Dekan Fakultas Sains dan Teknologi
UIN Sunan Ampel Surabaya



Dr. A. Saepul Hamdani, M. Pd.
NIP. 196507312000031002



UIN SUNAN AMPEL
SURABAYA

**KEMENTERIAN AGAMA
UNIVERSITAS ISLAM NEGERI SUNAN AMPEL SURABAYA
PERPUSTAKAAN**

Jl. Jend. A. Yani 117 Surabaya 60237 Telp. 031-8431972 Fax. 031-8413300
E-Mail: perpus@uinsby.ac.id

**LEMBAR PERNYATAAN PERSETUJUAN PUBLIKASI
KARYA ILMIAH UNTUK KEPENTINGAN AKADEMIS**

Sebagai sivitas akademika UIN Sunan Ampel Surabaya, yang bertanda tangan di bawah ini, saya:

Nama : Aliyyah Nafiisah
NIM : 09040121051
Fakultas/Jurusan : Fakultas Sains dan Teknologi/Biologi
E-mail address : nafiisahaliyyah@gmail.com

Demi pengembangan ilmu pengetahuan, menyetujui untuk memberikan kepada Perpustakaan UIN Sunan Ampel Surabaya, Hak Bebas Royalti Non-Eksklusif atas karya ilmiah :

☒ Skripsi ☐ Tesis ☐ Desertasi ☐ Lain-lain (.....)
yang berjudul :

PENGARUH PEMBERIAN VARIASI DOSIS TEH HIJAU KOMBUCHA TERHADAP

HITUNG TOTAL JUMLAH DAN JENIS LEUKOSIT MENCIT (*Mus musculus*)

beserta perangkat yang diperlukan (bila ada). Dengan Hak Bebas Royalti Non-Eksklusif ini Perpustakaan UIN Sunan Ampel Surabaya berhak menyimpan, mengalih-media/format-kan, mengelolanya dalam bentuk pangkalan data (database), mendistribusikannya, dan menampilkan/mempublikasikannya di Internet atau media lain secara **fulltext** untuk kepentingan akademis tanpa perlu meminta ijin dari saya selama tetap mencantumkan nama saya sebagai penulis/pencipta dan atau penerbit yang bersangkutan.

Saya bersedia untuk menanggung secara pribadi, tanpa melibatkan pihak Perpustakaan UIN Sunan Ampel Surabaya, segala bentuk tuntutan hukum yang timbul atas pelanggaran Hak Cipta dalam karya ilmiah saya ini.

Demikian pernyataan ini yang saya buat dengan sebenarnya.

Surabaya, 13 Januari 2026

Penulis

(Aliyyah Nafiisah)

ABSTRAK

PENGARUH PEMBERIAN VARIASI DOSIS TEH HIJAU KOMBUCHA TERHADAP HITUNG TOTAL JUMLAH DAN JENIS LEUKOSIT MENCIT (*Mus musculus*)

Kombucha teh hijau merupakan minuman fermentasi yang mengandung senyawa bioaktif berpotensi sebagai imunomodulator. Kandungan bioaktif dihasilkan melalui fermentasi dengan starter SCOBY (Symbiotic Culture of Bacteria and Yeast) yang menghasilkan senyawa yang bermanfaat. Penelitian ini bertujuan untuk mengetahui pengaruh variasi dosis teh hijau kombucha terhadap jumlah dan jenis leukosit pada mencit (*Mus musculus*). Penelitian menggunakan rancangan eksperimental dengan 25 ekor mencit jantan yang dibagi ke dalam lima kelompok (K- P5), yaitu K dengan aquades dan empat kelompok perlakuan dengan dosis kombucha P1 (0,45); P2 (0,68); P3(0,91); dan P4 (1,41) ml/BB yang diberikan selama 30 hari. Data jumlah dan jenis leukosit dianalisis menggunakan uji Normalitas, Homogenitas, Anova, Post Hoc LSD, Kruskal-Wallis, Man-Whitney sesuai distribusi data. Hasil penelitian menunjukkan bahwa pemberian kombucha teh hijau dosis K, P1, P2, dan P3 dapat meningkatkan leukosit pada batas normal ($6-15 \times 10^3 \text{ sel/mm}^3$), namun pada dosis P4 terjadi peningkatan leukosit berada diatas batas normal dan terjadi perbedaan nyata pada uji statistik jumlah neutrofil segmen dan limfosit pada perlakuan P4 yang menandakan adanya sistem imun adaptif yang berlebihan. Perlakuan yang aman untuk mengkonsumsi kombucha teh hijau disarankan pada dosis K, P1, P2, P3 untuk homeostasis imun dan tidak mengganggu secara fisiologis..

UIN SUNAN AMPEL
SURABAYA

Kata kunci: antioksidan, kombucha, jumlah leukosit, jenis leukosit, teh hijau

ABSTRACT

THE EFFECT OF VARYING DOSES OF GREEN TEA KOMBUCHA ON THE NUMBER AND TYPE OF LEUKOCYTES IN MICE (*Mus musculus*)

Green tea kombucha is a fermented beverage that contains bioactive compounds with potential as immunomodulators. The bioactive content is produced through fermentation with a SCOBY (Symbiotic Culture of Bacteria and Yeast) starter that produces beneficial compounds. This study aims to determine the effect of varying doses of green tea kombucha on the number and type of leukocytes in mice (*Mus musculus*). The study used an experimental design with 25 male mice divided into five groups (K-P5), namely K with distilled water and four treatment groups with kombucha doses of P1 (0.45); P2 (0.68); P3 (0.91); and P4 (1.41) ml/BW administered for 30 days. Data on the number and type of leukocytes were analyzed using Normality, Homogeneity, Anova, Post Hoc LSD, Kruskal-Wallis, and Man-Whitney tests according to data distribution. The results showed that administration of green tea kombucha at doses K, P1, P2, and P3 increased leukocytes to normal levels ($6-15 \times 10^3$ cells/mm³), but at dose P4, leukocytes increased above normal levels and there was a significant difference in the statistical test of segmented neutrophil and lymphocyte counts in treatment P4, indicating an excessive adaptive immune system. Safe consumption of green tea kombucha is recommended at doses K, P1, P2, and P3 for immune homeostasis and without causing physiological disruption.

Keywords: antioxidants, kombucha, leukocyte count, leukocyte type, green tea

DAFTAR ISI

HALAMAN SAMPUL	i
HALAMAN PERSETUJUAN.....	ii
LEMBAR PENGESAHAN PENGUJI SKRIPSI	iii
LEMBAR PERNYATAAN KEASLIHAN.....	iv
LEMBAR PERNYATAAN PERSETUJUAN PUBLIKASI KARYA ILMIAH....	v
ABSTRAK.....	vii
KATA PENGANTAR	ix
DAFTAR ISI.....	x
DAFTAR TABEL.....	xii
DAFTAR GAMBAR	xiii
DAFTAR LAMPIRAN.....	xiv
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang.....	1
1.2 Rumusan Masalah.....	7
1.3 Tujuan Penelitian.....	7
1.4 Manfaat Penelitian.....	7
1.5 Batasan Penelitian.....	7
1.6 Hipotesis Penelitian	8
BAB II KAJIAN PUSTAKA.....	9
2.1 Sistem Imun	9
2.2 Leukosit.....	14
2.3 Hitung Jumlah Leukosit	19
2.4 Hitung Jenis Leukosit.....	20
2.5 Immunomodulator.....	21
2.6 Antioksidan	22
2.7 Kombucha	24
2.8 Fermentasi Kombucha	26
2.9 Kandungan Kombucha.....	29
2.10 Senyawa- senyawa Bioaktif Teh Kombucha	31
2.11 Mekanisme Senyawa Bioaktif dapat Meningkatkan Sistem Imun	37
2.12 Tanaman Teh Hijau (<i>Camelia cinensis</i>)	38
2.13 Kadar Fenolik Daun Teh Hijau (<i>Camelia cinensis</i>).....	41

2.14 Kandungan Total Asam	42
2.15 Uji Total Kadar Asam Tertitasi Kombucha.....	42
2.16 Mencit	43
BAB III METODE PENELITIAN.....	45
3.1 Rancangan Penelitian	45
3.2 Waktu dan Tempat Penelitian	46
3.3 Alat dan Bahan.....	46
3.4 Variabel Penelitian	47
3.5 Prosedur Penelitian.....	47
3.6 Analisis Data	58
BAB IV HASIL DAN PEMBAHASAAN	59
4.1 Karakteristik Kimia Kombucha Teh Hijau	59
4.1.1 Kadar Total Asam Tirtasi Kombucha Teh Hijau (<i>Camelia cinensis</i>).....	59
4.1.2 Kadar pH Kombucha Teh Hijau (<i>Camelia cinensis</i>)	62
4.1.3 Kadar Fenolik Kombucha Teh Hijau (<i>Camelia cinensis</i>).....	64
4.1.4 Kadar Aktivitas Antioksidan Kombucha Teh Hijau (<i>Camelia cinensis</i>).....	69
4.1.5 Senyawa Fitokimia Kombucha Teh Hijau (<i>Camelia cinensis</i>).....	76
4.2 Pengaruh Kombucha Terhadap Hitung Total Jumlah Leukosit.....	82
4.3 Pengaruh Kombucha Terhadap Hitung Jenis Leukosit.....	88
4.1.1 Basofil	93
4.1.2 Eosinofil.....	91
4.1.3 Neutrofil Batang.....	91
4.1.4 Neutrofil Segmen.....	92
4.1.5 Limfosit.....	93
4.1.6 Monosit.....	94
BAB V PENUTUP.....	96
5.1 Kesimpulan	96
5.2 Saran.....	96
DAFTAR PUSTAKA	98
LAMPIRAN.....	112

DAFTAR TABEL

Tabel 2.1 Tempat Terjadinya Hematopoiesis	12
Tabel 3.1 Jadwal Pelaksanaan Penelitian	39
Tabel 3.2 Kolom Perhitungan Jenis Leukosit	58
Tabel 4.1 Kadar Total Asam Tertitrasi Kombucha Teh Hijau	61
Tabel 4.2 Nilai pH Kombucha Teh Hijau	63
Tabel 4.3 Absorbansi Standar Asam Galat	66
Tabel 4.4 Total Phenolic Content (TPC) Kombucha Teh Hijau	67
Tabel 4.5 Persen Inhibisi Aktivitas Antioksidan	71
Tabel 4.6 Hasil Uji Fitokimia Teh Hijau Kombucha	77
Tabel 4.7 Jumlah Total Leukosit Mencit	83
Tabel 4.8 Uji Homogenitas Jumlah Leukosit	84
Tabel 4.9 Uji Normalitas Jumlah Leukosit	84
Tabel 4.10 Hasil Uji ANOVA Jumlah Leukosit	84
Tabel 4.11 Hasil Uji Lanjut Post Hoc LSD	84
Tabel 4.12 Rata-rata Jenis Leukosit Mencit	88
Tabel 4.13 Uji Normalitas Jenis Leukosit	89
Tabel 4.14 Hasil Uji Kruskal–Wallis Jenis Leukosit	90
Tabel 4.15 Hasil Uji Mann–Whitney Jenis Leukosit	91

UIN SUNAN AMPEL
S U R A B A Y A

DAFTAR GAMBAR

Gambar 2.1 Tahapan Hematopoiesis	13
Gambar 2.2 Sel Neutrofil Segmen	16
Gambar 2.3 Sel Neutrofil Batang	16
Gambar 2.4 Sel Eosinofil	17
Gambar 2.5 Sel Basofil	17
Gambar 2.6 Sel Limfosit	18
Gambar 2.7 Sel Monosit	19
Gambar 2.8 Bentuk Koloni Teh Fermentasi Kombucha	26
Gambar 2.9 Proses Metabolisme Teh Kombucha	27
Gambar 2.10 Struktur Senyawa Flavonoid	33
Gambar 2.11 Struktur Senyawa Fenolik	33
Gambar 2.12 Struktur Senyawa Alkaloid	34
Gambar 2.13 Struktur Senyawa Saponin	35
Gambar 2.14 Struktur Senyawa Tanin	36
Gambar 2.15 Struktur Senyawa Steroid	36
Gambar 2.16 Struktur Senyawa Triterpenoid	37
Gambar 2.17 Tanaman Teh Hijau (<i>Camellia sinensis</i>)	39
Gambar 2.18 Hewan Mencit (<i>Mus musculus</i>)	44
Gambar 3.1 Bilik Hitung Improved Neubauer	55
Gambar 3.2 Pola Menghitung Sel Leukosit	56
Gambar 4.1 Grafik Kadar Total Asam Tertitrasi Kombucha	61
Gambar 4.2 Grafik pH Kombucha Teh Hijau	64
Gambar 4.3 Kurva Standar Asam Galat	67
Gambar 4.4 Grafik Kadar Fenolik Kombucha	68
Gambar 4.5 Reaksi Reduksi DPPH	71
Gambar 4.6 Grafik Persamaan Linier Persen Inhibisi	72
Gambar 4.7 Diagram Jumlah Total Leukosit Mencit	83
Gambar 4.8 Diagram Rata-rata Jenis Leukosit Mencit	89
Gambar 4.9 Gambar Leukosit Mencit	93

DAFTAR LAMPIRAN

Lampiran 1 Tabel Konversi Berat MAnusia pada Hewan -Hewan	125
Lampiran 2 Perhitungan Kadar TAT	125
Lampiran 3 Perhitungan Kandungan Fenolik	126
Lampiran 4 Perhitungan Persen Inhibisi	128
Lampiran 5 Perhitungan Aktivitas Antioksidan.....	129
Lampiran 6 . Tabel Perhitungan Jenis Leukosit Mencit	129
Lampiran 7 Tabel Uji Fitokimia Teh Hijau Kombucha.....	130
Lampiran 8 Analisis Data Jumlah Total Leukosit secara SPPS.....	132
Lampiran 9 Analisis Data Hitung Jenis Total Leukosit secara SPSS	134
Lampiran 10 Foto Kegiatan.....	141



UIN SUNAN AMPEL
S U R A B A Y A

DAFTAR PUSTAKA

- Adisti, S., Subagaya, Y. & Anggraini, R., 2018. Korelasi Antara Numeric Rating Scale dengan Peningkatan Monosit pada Pasien Hernia Nucleus Pulposus Lumbal. *Journal Collosum Neurol*, Volume 01(01), pp. 40-48.
- Adiwati, P. & Kusnadi, 2., 2003. Kultur Campuran dan Faktor Lingkungan Mikroorganisme yang Berperan dalam Fermentasi Tea-Cider, *PROC. ITB Sains dan Teknologi*, Volume 35(02), pp. 147-162.
- Afiani, E., Kusumanngrum, I. & Rifqi, M., 2024. Pengaruh Lama Fermentasi Terhadap Karakteristik Kimia dan Sensori Kombucha Wedang Uwuh. *Jurnal Sains*, Volume 03(10), pp. 01-15.
- Agustin, L. & Agustina, R., 2020. Komparasi Ujuk Kerja Peralatan Spektrofotometer UV-Vis Perkin Elmer Lambda 3 dengan Hitachi U-2900 pada Penentuan Total Phenolic Content. *Jurnal Teknik Ilmu dan Aplikasi*, Volume 08(01), pp. 42-45.
- Agustina, E. et al., 2023. The Effect of Fermentation Time on Antioxidant Activity of Vanilla. *ICOSHPRO*, pp. 202-212.
- Alivitameita, A. & Puspitasari, 2019. *Buku Ajar Hematologi*. Sidoarjo: Umsida Press.
- Aloulou, A. et al., 2012. Hypoglycemic and antilipidemic properties of kombucha tea in alloxan-induced diabetic rats. *BMC Complementary and Alternative Medicine*, Volume 12, pp. 11-15.
- Anderson, L. et al., 2023. Revisi atas Taksonomi Bloom (et.al.) Udin Juhrocin Terjemah atas: A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives (Abridge Edition), pp. 74-77.
- Angelia, I., 2017. Kandungan pH, Total Asam Tertitiasi, Padatan Terlarut dan Vitamin C pada Beberapa Komoditas Hortikultura (pH Content, Total Acidified Acid, Dissolved Solids, and Vitamin C in Some Horticultural Commodities). *Journal of Agritech*, Volume 01(02), pp. 68-74.
- Ansory, H., Putri, A., Wulantika, W. & Harmastuti, N., 2023. Peningkatan Aktivitas Antioksidan Pada Ekstrak Daun Kelor (*Moringa Oleifera*) Melalui Fermentasi: Studi Perbandingan Kandungan Fenolik Dan Aktivitas Antioksidan. *Jurnal Farmasi Indonesia*, Volume 54-63, p. 20(01).
- Anton, N., Yudishtita, A. & Siampa, J., 2021. Uji Aktivitas Antioksidan dari Ekstrak Etanol Spons (*lanthella basta*) dari Desa Tumbak Kecamatan Pusomaen Kabupaten Minahasa Tenggara. *Journal Pharmacon*, Volume 10(01), pp. 713-719.

- Agathokleous, E. dan Calabrese, E.J. (2020) "A global environmental health perspective and optimisation of stress," *Science of the Total Environment*, 704, hlm. 135263.
- Andrade, E.D.S. dkk. (2024) "Immunomodulatory Effects of Green Tea Catechins and Their Ring Fission Metabolites in a Tumor Microenvironment Perspective," *Molecules*, 29(19), hlm. 4575.
- Antolak, H., Piechota, D. dan Kucharska, A. (2021) "Kombucha tea—A double power of bioactive compounds from tea and symbiotic culture of bacteria and yeasts (SCOBY)," *Antioxidants*, 10(10), hlm. 1541.
- A. P. & K., 2003. Kultur Campuran dan Faktor Lingkungan Mikroorganisme yang Berperan dalam Fermentasi Tea-Cider, *PROC. ITB Sains dan Teknologi*, Volume 35(02), pp. 147-162.
- Apriyanto, A. & Rasak, A., 2024. The Role of Cluster of Differentiation CD 8+ in The Immune System. *Jurnal Riset Ilmiah*, Volume 01(02), pp. 70-79.
- Arifin, H. et al., 2022. Analysis of Modifiable, Non-Modifiable, and Physiological Risk Factors of Non-Communicable Diseases in Indonesia: Evidence from the 2018 Indonesian Basic Health Research. *Journal of Multidisciplinary Healthcare*, Volume 15, pp. 2203 - 2221.
- Azizah, L., 2016. *Buku Ajar Keperawatan Kesehatan Jiwa*. Yogyakarta: Indomedia Pustaka.
- Basyreva, L. dkk. (2021) "Effect of Vitamin D3 in combination with Omega-3 Polyunsaturated Fatty Acids on NETosis in Type 2 Diabetes Mellitus Patients," *Oxidative Medicine and Cellular Longevity*, 2021. Tersedia pada: <https://doi.org/10.1155/2021/8089696>
- Bacha, W. & Bacha, L., 2000. *Color Atlas of Veterinary Histology*. 2 penyunt. Unisted States of America: Lippincott Williams & Wilkins.
- Badarinath, et al., 2010. A Review on In-vitro Antioxidant Methods : Comparisons, Correlations, and Considerations. *International Journal of PharmTech Research*, pp. 1276-1285.
- Bakhri, S., 2018. Analisis Jumlah Leukosit Dan Jenis Leukosit Pada Individu Yang Tidur Dengan Lampu Menyala Dan Yang Dipadamkan. *Jurnal Media Analisis Kesehatan*, Volume 01(01), pp. 83-91.
- Balafif, Ragaya, A. R., Yayuk, A. & Ryanti, G., 2013. Analisis Senyawa Triterpenoid Dari Hasil Fraksinasi Ekstrak Air Buah Buncis (*Phaseolus Vulgaris* Linn). *Journal Chemistry*, Volume 06(02), pp. 56-61.
- Baratawidjaja, K. G. & Rengganis, L., 2006. *Imunologi Dasar*. Jakarta: Fakultas Kedokteran Universitas Indonesia .
- Barret, A., Rezvani, K., Soloman, S. & Dickinson, A. M., 2003. New developments in allotransplant immunology. *Journal Sains*, Volume 01, pp. 350-357.

- Batista , E. et al., 2021. Enzymatic Electroanalytical Biosensor Based on MArmiellus Colocasiae Fungus for Detection of Phytomarkers in Infusions and Green Tea KOmbucha. *Biosensors*, Volume 01- 09, p. 11.
- Blainski, A., Cristiny, L. & Palazzo de Mello, J., 2013. Application and Analysis of the Folin Ciocalteu Method for the Determination of the Total Phenolic Content from Limonium Brasiliense L. *Molecules*, Volume 18, pp. 6852-6865.
- Brinkmann, V. et al., 2004. Neutrophil Extracellular Traps Kill Bacteria. *Science*, Volume 303, pp. 1532-2535.
- Brown, A., 1994. The Advancement of Learning. *Educational Researcher*, Volume 23(08), pp. 04-12.
- Clauss, M. (2012) "Clinical Technique: Feeding Hay to Rabbits and Rodents," *Journal of Exotic Pet Medicine*, 21(1), hlm. 80–86. Tersedia pada: <https://doi.org/10.1053/j.jepm.2011.11.005>.
- Clauss, T., Dove, A. dan Arnold, J. (2008) "Hematologic disorders of fish," *Veterinary Clinics of North America Exotic Animal Practice*, 11, hlm. 445–462.
- Carr, A. C. & Manggini, S., 2017. Vitamin C and Immune Function. *Nutrients*, Volume 9, pp. 1110-1211.
- Chakravorty , S. et al., 2016. Antioxidant and Antimicrobial Activity of Kombucha Tea. *International Journal of Food Science and Technology* , pp. 1290-1299.
- Choi, I., Cha, H. & Lee, Y., 2014. Physicochemical and Antioxidant Properties of Black Garlic. *Molecules*, Volume 19 (10), pp. 16811-16823.
- Coelho, V., Bear , G. & Bras, P., 2020. A Multilevel Analysis of The Importance of School Climate for The Trajectories of Students Self - Concept and Sel - Esteem Throughout The middle School Transition. *Journal of Youth and Adolescence*, Volume 49 (09), pp. 1793-1804.
- Cohen, T. et al., 2021. Granulocyte Transfusion: Clinical Updates and a Practical Approach to Transfusion. *Elsevier*, Volume 41(04), pp. 647-657.
- Ding, S., Jiang, H. dan Fang, J. (2018) "Regulation of immune function by polyphenols," *Journal of immunology research*, 2018(1), hlm. 1264074.
- Danarto, Y., Prihananto, S. & Pamungkas, Z., 2011. Pemanfaatan Tanin dari Kulit Kayu Bakau sebagai Pengganti Gugus Fenol pada Resin Fenol Formaldehid. *Prosiding Seminar Nasional Teknik Kimia*, pp. 11-16.
- Darwin , C., 2016. Gambaran Sel Darah Putih pada Respon Inflamasi Pasca Pemasangan Implan yang Dilapisi Platelet Rich Plasma dan tanpa Dilapisi Platelet Rich Plasma dan tanpa Dilapisi Platelet Rich Plasma. *Skripsi*, Volume Fakultas Kedokteran Gigi. Universitas Hassanuddin Makassar.

- Day, R. & Underwood, A., 2002. *Analisis Kimia Kuantitatif Edisi Keenam*. Jakarta: Erlangga.
- Dhurhania, C. & Novianto, A., 2018. Uji Kandungan Fenolik Total dan Pengaruhnya Terhadap Aktivitas Antioksidan dari Berbagai Bentuk Sediaan Sarang Semut (*Myrmecodia pendens*). *Jurnal Farmasii dan Ilmi Kefarmasian Indonesia*, Volume 05(02), pp. 62-68.
- Diehl, K. H. et al., 2001. A Goog Practice Guide to The Administration of Substances and Removal of Blood, Including Routes and Volumes. *Journal of Applied Toxicology*, Volume 21(01), pp. 15-23.
- Ding, S., Jiang, H. & Fang, J., 2018. Regulation of Immune Function by Polyphenols. *Journal of Immunology Research*, Volume 01(01), pp. 10-12.
- Diniyah, N. & Han Lee, S., 2020. Komposisi Senyawa Fenol dan Potensi Antioksidan dari Kacang - kacangan. *Jurnal Agroteknologi*, Volume 14(01), pp. 91-102.
- Diniyah, N. & Lee, S., 2020. Komposisi Senyawa Fenol dan Potensi Antioksidan dari Kacang - kacangan. *Jurnal Agroteknologi*, Volume 14(01), pp. 91-102.
- Dinkes, P. J. T., 2023. *Profil Kesehatan Provinsi Jawa Timur Tahun 2022*. Jawa Timur: Dinkes. Jatimpro.
- Dinkes, P. J. T., 2024. *Profil Kesehatan Provinsi Jawa Timur Tahun 2023*. Jawa Timur : Dinkes. Jatimprov.
- Duenas, M., Hernandez & Estrella, 2007. Changes in The Content of Bioactive Polyphenolic Compounds of Lentils by the Action of Exogeneous Enzymes Effect on Their Antioxidant Activity. *Journal Food Chemistry*, Volume 101, pp. 90-97.
- Dwiloka, B., Rahman, F. T. & Mulyani, S., 2021. Nilai pH, Viskositas dan Hedonik Sari Buah Jeruk Manis dengan Penambahan Gelatin Tulang Ikan Bandeng. *Journal of Agri- Food, Nutrition, and Public Health*, Volume 02(02), pp. 107-113.
- Eric & Childs, J., 2013. *Kombucha (The Amazing Probiotic Tea That Cleanses, Heals, Energizes, and Detoxifies)*. New York: Avery.
- Erniati, E. & Ezraneti, R., 2020. Aktivitas Imunomodulator Ekstrak Rumput Laut. *Acta Aquatica Sciences Journal*, Volume 07(02), pp. 79-86.
- Ernis, G. et al., 2021. Uji In Vitro Aktivitas Imunomodulator Minyak Atsiri Serai Dapur (*Cymbopogon citratus*) Terhadap Proliferasi Sel Limfosit Mencit.. *Bioedusains*, Volume 04(02), pp. 129-135.
- Fadhilah, Z.H., Perdana, F. dan Syamsudin, R.A.M.R. (2021) “Telaah kandungan senyawa katekin dan Epigallocatekin Galat (EGCG) sebagai antioksidan pada berbagai jenis teh,” *Jurnal Pharmascience*, 8(1), hlm. 31–44.

- Fahrimal, Y. dkk. (2015) "PROFIL DARAH TIKUS PUTIH (*Rattus norvegicus*) YANG DIINFEKSIKAN *Trypanosoma evansi* DAN DIBERIKAN EKSTRAK KULIT BATANG JALOH (*Salix tetrasperma* Roxb)," *Jurnal Kedokteran Hewan - Indonesian Journal of Veterinary Sciences*, 8. Tersedia pada: <https://doi.org/10.21157/j.ked.hewan.v8i2.2653>.
- Ghutama, B.S., Maharani, I. dan Wirattami, A.T. (2025) "HUBUNGAN RINITIS ALERGI DENGAN OTITIS MEDIA EFUSI," *Malang Otorhinolaryngology Head and Neck Surgery Journal*, 4(2), hlm. 9–16.
- Faiz , G. et al., 2024. Green Tea Kombucha Impacts Inflammation and Salivary Microbiota in Individuals with Excess Body Weight : A Randomized Controlled Trial. *Nutrients*, pp. 01-23.
- Fauzia, S., 2014. Uji Aktivitas Antioksidan dan Kestabilan Fisik Sediaan Krim Ekstrak Daun Teh Hijau dan Krim Ekstrak Daun Teh Putih (*Camellia sinensis*. *Skripsi*, Volume Fakultas Farmasi, Universitas Indonesia. Jakarta.
- Feninlambir , M., Rawar, E. & Yuhara , N., 2023. Aktivitas Antioksidan dan Kadar Total Fenolik dalam Minyak Atsiri Biji Pala (*Myristica fragrans* Houtt.). *Jurnal Penelitian Farmasi Indonesia* , Volume 12(02), pp. 111-116.
- Filbert , F., Koelangan , H., Runtuwene, M. & Fernad, V., 2014. Penentuan Aktivitas Antioksidan Berdasarkan nilai IC50 ekstrak metanol dan fraksi hasil partisinya pada kulit biji pinang yaki (*Areca vestiara* Giseka. *Jurnal MIPA Unsrat Online*, Volume 03(02), pp. 149-154.
- Fluckiger, J. & Ettlinger, L., 1977. Glucose metabolism in *Acetobacter aceti*. *Archives of Microbiology*, Volume 114, pp. 183-187.
- Frandsen, R., 1992. *Anatomi dan Fisiologi Ternak 4th ed*. Yogyakarta: Gajah Mada University Press.
- Fristiohady, A. et al., 2020. Level of Cytokineninterleukin-6 andinterleukin 1 - B on Infectious Rat Model Treated with Etlingera Elation RM Smith Fruit Ectract Immunomodulator. *Borneo Journal of Pharmacy* , Volume 03(02), pp. 52-57.
- Fu, L. et al., 2011. Total Phenolic Contents and Antioxidant Capacities of Herbal and Tea Infusions. *Journal Molecular Sciences* , Volume 12, pp. 2112-2124.
- Godlewska, K. dkk. (2023) "Investigation of chemical constituents and antioxidant activity of biologically active plant-derived natural products," *Molecules*, 28(14), hlm. 5572.
- Garro, A., Chiapello, L., Baronetti, J. & Masih, D., 2010. Rat eosinophils stimulate the expansion of *Cryptococcus neoformans*specific cCD4+ and CD8+ T cells with a T-helper 1 profile. *Immology*, Volume 132, pp. 174-187.
- Giyartika, F. & Keman, S., 2020. Perbedaan Peningkatan Leukosit pada Radiografer di Rumah Sakit Islam Jemursari Surabaya. *Jurnal Kesehatan Lingkungan*, Volume 12 (02), pp. 97-106.

- Gomez, C. M. C., Domenech, E. & Vina, J., 2008. Moderate Exercise is an Antioxidant Upregulation of Antioxidant genes by Training. *Jurnal Radical Biology and Medicine*, Volume 44 (02), pp. 126 - 131.
- Greenwalt, C., Steinkraus, K. & Ledford, R., 2016. Kombucha, The Fermented Tea: Microbiology, Composition, and Claimed Health Effects.. *Journal of Food Protection*, Volume 63(07), pp. 976-981.
- Guli, M., 2021. Respon Imun Hospes Terhadap Infeksi *Vibrio cholerae*. *Biocelbes*, Volume 15(02), pp. 113-124.
- Gultom, D., Saraswati, I. & Sasikirana, W., 2021. Penetapan Kandungan Fenolik Total dan Uji Aktivitas Antioksidan Fraksi Etil Asetat Ekstrak Etanolik Kubis Ungu (*Brassica oleraceae* var. *capitata*/L). *Journal of Researcrh in Pharmacy*, Volume 01(02), pp. 80-87.
- Guyton, A. & J.E, H., 2006. Textbook of Medical Physiology. *Elsevier*, pp. 01-13.
- Habiburrohman, D. dan Sukohar, A. (2018) “Aktivitas antioksidan dan antimikrobal pada polifenol teh hijau,” *Jurnal Kesehatan dan Agromedicine*, 5(02), hlm. 587–591.
- Halliwell, B. (2013) “The antioxidant paradox: less paradoxical now?,” *British journal of clinical pharmacology*, 75(3), hlm. 637–644.
- Holderness, J. dkk. (2008) “Response of $\gamma\delta$ T cells to plant-derived tannins,” *Critical ReviewsTM in Immunology*, 28(5).
- Halimu, R., Sulistijowati, R. & Mile, L., 2017. Identifikasi Kandungan Tanin pada *Sonneratia Alba*. *Jurnal Imu Perikanan dan Kelautan*, Volume 05(04), pp. 93-96.
- Hamidin, A. S., 2014. *Buku Lengkap : Imunitas Alami untuk Anak*. Yogyakarta: Saufa.
- Hannani, E., Mun'im, A. & Sekarini, R., 2005. Identifikasi Senyawa Antioksidan Dalam Spons *Callyspongia* sp Dari Kepulauan Seribu. *Jurnal Ilmu Kefarmasian*, Volume 02(03), pp. 127-133.
- Harborne, J., 1987. *Metode Fitokimia : Penuntun Cara Modern Menganalisis Tumbuhan Edisi ke-2*. Bandung: ITB.
- Hardiyanthi, F., 2015. Pemanfaatan Aktivitas Antioksidan Ekstrak Daun Kelor (*Moringa oleifera*) dalam Sediaan Hand and Body Cream. *Skripsi*, Volume Fakultas Sains dan Teknologi. Uin Syarif Hidayatullah. Jakarta.
- Hasruddin, H. & Pratiwi, N., 2015. *Mikrobiologi Industri*. Bandung: Alfabeta.
- Hassmy, N., Abidulu, J. & Yudistira, A., 2017. Analisis Aktivitas Antioksidan pada Teh Hijau Kombucha Berdasarkan Waktu Fermentasi yang Optimal. *Jurnal Ilmiah Farmasi*, Volume 06(04), pp. 67-74.

- Hendrajid, Z. et al., 2020. Jenis Leukosit Mencit (*Mus musculus*) Pasca Stress Akut dengan Perlakuan Ekstrak Etanol Biji Pala (*Myristica fragrans* Houtt). *Jurnal Pattimura Mediacal Review* , Volume 02(02), pp. 104-118.
- Hidayanti , M., Astuti, S. & Kustyawati, M., 2014. Pengaruh Pemberian "Kombucha " Teh Rosella Terhadap Darah Mencit (*Mus musculus* L.). *Jurnal Agritech* , Volume 34 (04), pp. 01-09.
- Hidayanti , M. D., Astuti , S. & Kutyawati , M. E., 2014. Pengaruh pemberian “Kombucha” teh rosella terhadap profil darah mencit (*Mus musculus* L). *Agritech*, Volume 34(04), pp. 382-389.
- Hidyana, V. & Kusuma, A., 2017. Uji Aktivitas Antioksidan Teh Kombucha Daun Coklat (*Theobroma cacao* L.) Berdasarkan Lama Fermentasi. *Jurnal Farmasi Higea* , Volume 09(02), pp. 103-108.
- Hoffbrand, A., 2016. *Kapita Selekta Hematologi*. Jakarta: Buku Kedokteran EGC.
- Hoffbrand, A., Moss, P., Pendit, B. & Iriani, A., 2005. *Kapita Selekta Hematologi*. Jakarta: Buku Kedokteran EGC.
- Hudaya , K., 2016. Desain Titrator Otomatis untuk Pengukuran Dua Titrasi Secara Simultan. *Skripsi* , Volume Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Jember. Jember.
- Hunandar , V., 2016. Penetapan Daya Antioksidan dan Kadar Total Fenolik Kombucha Dibandingkan Teh Hijau Secara Spektrofotometri. *Jurnal ilmiah Mahasiswa Universitas Surabaya* , Volume 05(02), pp. 435-445.
- Hutasuhut , D., Aspriyanto, D., Wayan, I. & Firdaus, A., 2022. Uji Kualitatif dan Kuantitatif Ekstrak Kulit Buah Rambai (*Baccaurea Motleyana*) Konsentrasi 100%. *Jurnal Kedokteran gigi*, Volume 06(02), pp. 97-108.
- Illing , I., Safitri, W. & Erfiana, E., 2017. Uji Fitokimia Ekstrak Buah Dengan. *Journal of Mathematics and Natural Science*, Volume 08(01), pp. 66-84.
- Indrawati, R. & Prasdini, W., 2017. Profil Leukosit pada Kelinci Pasca Bedah New Zealand White Anterior Cruciate Ligament (ACL). *Jurnal Agrosains*, Volume 01(02), pp. 01-09.
- Irma, A. & Miladiarsi, 2023. Penyuluhan Manfaat Teh Kombucha sebagai Minuman Probiotik di Desa Moncongloe Bulu, Kecamatan Moncongloe, Kabupaten Maro. *Jurnal Pengabdian Masyarakat Bhinneka*, Volume 01(03), pp. 165-170.
- Jacoby & Foz, 1984. *Biology and disease of mice*. Academic Press. Orlando: Academic Press.
- Jakubczyk, K. dkk. (2020) “Chemical profile and antioxidant activity of the kombucha beverage derived from white, green, black and red tea,” *Antioxidants*, 9(5), hlm. 447.

- Jodynys-Liebert, J. dan Kujawska, M. (2020) "Biphasic dose-response induced by phytochemicals: experimental evidence," *Journal of Clinical Medicine*, 9(3), hlm. 718.
- Jones, M.P. (2015) "Avian Hematology," *Veterinary Clinics of North America: Exotic Animal Practice*, 18(1), hlm. 51–61. Tersedia pada: <https://doi.org/10.1016/j.cvex.2014.09.012>.
- Jakubczyk, K., Gutowaska, J., Antoniewicz, J. & Janda, 2020. Chemical Profile and Antioxidant Activity of The Kombucha Beverage Derived from White, Green, Black, and Red Tea. *Journal Antioxidant* , Volume 447, pp. 01-15.
- Jennings , V. & Dillehay, D., 2006. *The Laboratory Rat*. USA: America College of Laboratory Animal Medicine .
- John, A. K, 1977. *Differential Leukocyte Counting*. Amrican : College of American Pathologists .
- Jones , R. & Love, R., 2017. Biocompatibility, Suface Enginnering, and Delivery of Drugs, Genes, and Other. *Molecules*, Volume 04, pp. 44-56.
- Jumriani , J., Massi, N. & Nontji, W., 2021. Perbedaan Kadar Leukosit pada Ibu Ketuban Pecah Dini dan Partus Lama. *Jurnal ilmiah Kesehataan* , Volume 14(01), pp. 11-18.
- Kamaluddin , M. & Handayani, M., 2018. Perbedaan Jenis Hidrokoloid Terhadap Karaktersitik Fruit Leatehr Pepaya. *Journal Edufortech* , Volume 03(01), pp. 01-07.
- Kim, Y.H. dkk. (2016) "Green tea catechin metabolites exert immunoregulatory effects on CD4+ T cell and natural killer cell activities," *Journal of agricultural and food chemistry*, 64(18), hlm. 3591–3597.
- Karadeniz, F., Burdurlu, H.S, Koca, N & Soyer, Y., 2005. Antioxidant Activity of Selected Fruits and Vegetables Grown in Turkey, Turkish. *Turkish Journal of Agricultural and Forest*, Volume 89, pp. 297-303.
- Kay, D. & Blumberg, I., 2002. The Role of Tea in Human Health. *The Journal of The American College of Nutrition*, Volume 21(01), pp. 01-13.
- Keohene, E., Smith , L. & Walenga, J., 2016. *Rodak's Hematology Clinical Principles and Applications (Fifth edit)*. Canada: Elsevier.
- Khafid, A. et al., 2023. Uji Kualitatif Metabolit Sekunder pada Beberapa Tanaman. *e- journal uindip*, Volume 08(01), pp. 61-70.
- Kharkar, et al., 2017. Nanosystems for Oral Delivery of Immunomodulators. *Elsevier*, pp. 295-334.

- Khasanah , D. U. & Dewi , E., 2024. Karakteristik Produk Minuman Kombucha Berdasarkan Komposisi Bahan Baku dan Waktu Fermentasi. *Jurnal Teknologi Separasi* , Volume 10(04), pp. 754-763.
- Khoddami, A., Wilkes, M. & Roberts, T., 2013. Technique for analysis of Plant Phenolic Compounds. *Molecules*, Volume 18, pp. 2328-2375.
- Korkmaz, N. et al., 2019. Investigation of antioxidant, cytotoxic, tyrosinase inhibitory activities, and phenolic profiles of green, white, and black teas. *Journal of Biochem*, Volume 44 (03), pp. 278-288.
- Korkmaz, N. et al., 2019. Investigation of Antioxidant, Cytotoxic, Tyrosinase Inhibitory Activities, and Phenolic Profiles of Green, White, and Black Teas. *Biochem*, Volume 44(03), pp. 278-288.
- Kunarto , B., 2005. *Teknologi Pengolahan Teh Hitam Sistem Orthodox*. Semarang: Semarang University Press.
- Lai, Y. dkk. (2025) "In vitro fermentation characteristics and prebiotic activity of herbal polysaccharides: a review," *Frontiers in Nutrition*, 12, hlm. 1687766.
- Latief, M. dkk. (2021) "ANTI INFLAMMATORY ACTIVITY OF SUNGKAI LEAVES (*Peronema canescens* JACK) ETHANOL EXTRACT IN CARRAGEENAN INDUCED MICE," *Jurnal Farmasi Sains dan Praktis*, 7, hlm. 144–153. Tersedia pada: <https://doi.org/10.31603/pharmacy.v7i2.4532>.
- Li, D. dkk. (2024) "The roles of epigallocatechin gallate in the tumor microenvironment, metabolic reprogramming, and immunotherapy," *Frontiers in immunology*, 15, hlm. 1331641.
- Li, W. dkk. (2015) "EGCG induces G-CSF expression and neutrophilia in experimental sepsis," *Immunologic research*, 63(1), hlm. 144–152.
- Lowe, G.M., Gana, K. dan Rahman, K. (2015) "Dietary supplementation with green tea extract promotes enhanced human leukocyte activity," *Journal of Complementary and Integrative Medicine*, 12(4), hlm. 277–282.
- Lane- Petter , W., 1976. *The Laboratory Mouse*. In *The UFAW Handbook on the Care and Management of Laboratory Animals*.. New York: Churchill Livingstone .
- Laureys, D., Britton, S. & De Clippeleer, J., 2020. Kombucha Tea Fermentation: A Review. Journal of the American Society of Brewing Chemists. *Journal of The American Society of Brewing Chemists*, Volume 78(03), pp. 165-174.
- Leal, J. M. et al., 2018. A Review on Health Benefits of Kombucha Nutritional Compounds and Metabolites.. *CYTA - Journal of Food* , Volume 16(01), pp. 390 - 299.
- Leba , M., 2024. Penentuan Kadar Asam Secara Titrasi Menggunakan Indikator Pigmen Rimpang Kunyit. *Jurnal Penelitian Sains* , Volume 26(03), pp. 338-342.

- Leslie , P. & Gunawan , S., 2019. 2019. *Uji Fiokimia dan Perbandingan Efek Antioksidan pada Daun Teh Hijau, Teh Hitam, dan Teh Putih (Camellia sinensis) dengan Metode DPPH* , Volume 01 (02), pp. 383-388.
- Lestari , K. & Sa'diyah , L., 2020. “Karakteristik Kimia dan Fisik Teh Hijau Kombucha pada Waktu Pemanasan yang Berbeda. *Journal of Pharmacy and Science*, Volume 05(01), pp. 15-20.
- Linden , M., Ward, J. & Cherian, S., 2012. *Comparative Anatomy and Histology A Mouse and Human Atlas*. USA: Elsevier .
- Liu, L. et al., 2017. Naringin Attenuates Diabetic Retinopathy by Inhibiting Inflammation, Oxidative Stress and NF-KB Activation in Vivo and in Vitro. *Journal of Basic Medical Sciences*, Volume 20(07), pp. 810-813.
- Li, Z., Zhu, Y. X. & Cheng, Y., 2021. Understanding Autism Spectrum Disorders with Animal Models: Applications, Insights, and Perspectives. *Zoological Research*, Volume 42(06), pp. 790-800.
- Lobo, V., Phatak & Chandra, N., 2010. Free Radicals, Antioxidants and Functional Foods: Impact on Human Health. *Pharmacognosy Reviews*, Volume 110-118, p. 04.
- Lorenzo, J. & Munekata, P., 2016. Phenolic compounds of green tea: Health benefits and technological application in food. *Asian Pacific Journal* , Volume 06(08), pp. 709-719.
- Lusiana , A., Ningrum , Y. & Putri , C., 2024. Pengaruh Lama Fermentasi Terhadap Aktivitas Antioksidan. *Jurnal ilmiah Sultan Agung* , pp. 01-12.
- Lusiana, A., Ningrum, Y. & Putri, C., 2024. Pengaruh Lama Fermentasi Terhadap Aktivitas Antioksidan Pada Variasi TheKombucha Dengan Metode ABTS (2,2 Azinobis (3-Ethylbenzotiazolin) 6 Sulphonic Acid). *Jurnal Ilmiah Sultan Agung*, Volume 01(02), pp. 01-12.
- Luthria , D., 2006. Influence of sample preparation on the assay of phytochemicals. *American Laboratory Journal* , Volume 38 07), pp. 01-12.
- Maghfirah, D., Pulungan, A., dkk. (2025) “Perbandingan Kandungan Fenolik dan Aktivitas Antioksidan pada Varian Seduhan Teh dan Varian Teh Kombucha Secara Spektrofotometri Visible,” *Journal of Pharmaceutical and Sciences*, hlm. 1384–1397. Tersedia pada: <https://doi.org/10.36490/journal-jps.com.v8i3.952>.
- Maghfirah, D., Pulungan, A.F., dkk. (2025) “Perbandingan Kandungan Fenolik dan Aktivitas Antioksidan pada Varian Seduhan Teh dan Varian Teh Kombucha Secara Spektrofotometri Visible,” *Journal of Pharmaceutical and Sciences*, hlm. 1384–1397.
- Maharani, S. (2025) “Literature Review: The Potential of Tea as an Immunomodulator Through Its Antioxidant and Anti-Inflammatory

- Properties,” *Antigen : Jurnal Kesehatan Masyarakat dan Ilmu Gizi*, 3, hlm. 135–145. Tersedia pada: <https://doi.org/10.57213/antigen.v3i3.738>.
- Marina, A.-D., Lorena, F. dan Marc, R. (2024) “Camellia sinensis L. (Green Tea): Bioactive Compounds and Pharmacological Properties – A Comprehensive Review,” *Hop and Medicinal Plants*, 32, hlm. 102–118. Tersedia pada: <https://doi.org/10.15835/hpm.v32i1-2.15020>.
- Martihandini, N. dan Rochimat, I. (2024) “Characteristics of four variants of kombucha tea as candidate of functional health drink,” *Jurnal Mandala Pharmacon Indonesia*, 10(1), hlm. 227–237.
- Martínez Leal, J. dkk. (2018) “A review on health benefits of kombucha nutritional compounds and metabolites,” *CyTA-Journal of Food*, 16(1), hlm. 390–399.
- Mazrouh, M.M. dkk. (2015) “Some Haematological Parameters and Blood Picture of Oreochromis niloticus in Manzalah Lake, Egypt,” *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN*, hlm. 2319–2402.
- Mitroulis, I. dkk. (2020) “Regulation of the bone marrow niche by inflammation,” *Frontiers in immunology*, 11, hlm. 1540.
- Musial, C., Kuban-Jankowska, A. dan Gorska-Ponikowska, M. (2020) “Beneficial properties of green tea catechins,” *International journal of molecular sciences*, 21(5), hlm. 1744.
- Mahadewi, P., Suastuti, N. & Massenga, L., 2022. Tingkat Kesukaan Panelis Terhadap Teh Kombucha Dengan Menambahkan Apel Hijau Malang Dan Bit Merah Melalui Uji Organoleptik. *Jurnal Gastronomi*, Volume 19(02), pp. 99-107.
- Maharani, A. et al., 2021. Peran Antioksidan Alami Berbahan Dasar Pangan Lokal dalam Mencegah Efek Radikal Bebas. *Prosiding Semkinar Nasional Biologi*, Volume 390-399, p. 01(02).
- Manghifirah, D., Pulungan, A., Ridwanto & Yuniarti, R., 2025. Perbandingan Kandungan Fenolik dan Aktivitas Antioksidan pada Varian Seduhan Teh dan Varian Teh Kombucha Secara Spektrofotometri Visibel. *Journal of Pharmaceutical and Sciences*, Volume 08(03), pp. 1384-1397.
- Maryani, M. & Rosdiana, R., 2020. Peranan Immunostimulan Akar Kuning *Arcangelisia flava* Merr pada Gambaran Aktivasi Sistem Imun Ikan Mas (*Cyprinus carpio* L).. *Jurnal Akuakultur*, Volume 08 (01), pp. 22-36.
- Masdiana, T., 2017. Penentuan Kadar Fenolik Total Ekstrak Etanol Daun Nilan (*Pogostemon Cablin Benth*) dengan Metode Spektrofotometri Uv- Vis. *Jurnal Fitokarma Indonesia*, Volume 04(01), pp. 01-10.
- McGarry, M., Protheroe, C. & Lee, J., 2010. *Mouse Hematology : A Laboratory Manual*. New York : Cold Spring Laboratory Press.
- Merriman, H., 2014. Leukocyte Count. *Elsevier*, pp. 313-334.

- Mescher, A., 2017. *Junqueira's Basic Histology: Text and Atlas, 14th Ed.* Jakarta: Jakarta:EGC Press.
- Molyneux , 2004. The Use of The Stable Free Radical Diphenylpicryl-hydrazyl (DPPH) for Estimating Antioxidant Activity. *Journal Science Technology* , Volume 26(02), pp. 211-219.
- Molyneux, P., 2004. The Use of The Stable Free Radical Diphenylpicrylhydrazyl (DPPH) for Estimating Antioxidant Activity.. *Jurnal Science Technology*, Volume 26(02), pp. 211-219.
- Mongkolsip , S., Pangbupakit , N., Sae- Lee & Sitthitaworn, 2004. Radical Scavenging Activity and Total Phenolic Content of Medical Plants Used in Primary Health Care. *Journal of Pharmacy and Science*, Volume 09(01), pp. 32-35.
- Muliani, H., 2011. Pertumbuhan Mencit (*Mus Musculus L .*) Setelah Pemberian Biji Jarak Pagar (*Jatropha curcas L .*). *Jurnal Anatomi dan Fisiologi*, Volume 21(01), pp. 44-54.
- Mu'nisa, A. et al., 2022. *Teknik Manajemen dan Pengelolaan Hewan Percobaan*. Makassar: UNM Publish.
- Murelina, E. & Wijayanti , E., 2018. Perbandingan Kadar Fenolik Total Sari Rimpang Temu Giring (*Curcuma heyneana*) Segar dan Terfermentasi. *Journal Cis-Trans* , Volume 02(02), pp. 20-24.
- Musa, W., Duengo, S. & Tahir, R., 2017. Senyawa Triterpenoid Dari Tumbuhan Mangrove (*Sonneratia alba*). *Jurnal ITEKImia*, Volume 01(01), pp. 36-45.
- Nasution, H. dan Situmorang, R. (2022) "ANALISIS BIOAUTOGRAFI DAN UJI AKTIVITAS ANTIBAKTERI EKSTRAK ETANOL DAUN MENGKUDU (*Morinda citrifolia L.*) TERHADAP BAKTERI *Propionibacterium acne*," *JURNAL FARMANESIA*, 9, hlm. 16–21. Tersedia pada: <https://doi.org/10.51544/jf.v9i1.3424>.
- Nurikasari, M., Puspitasari, Y. dan Siwi, R.P.Y. (2017) "Characterization and analysis kombucha tea antioxidant activity based on long fermentation as a beverage functional," *Journal of Global Research in Public Health*, 2(2), hlm. 48–52.
- Nyhan, L.M. dkk. (2022) "Advances in kombucha tea fermentation: A review," *Applied Microbiology*, 2(1), hlm. 73–103.
- Nabila, A., 2021. Uji Efek Imunomodulator Ekstrak N-heksan dan Etil Asetat Daun Kelapa Sawit (*Elaeis guineensis Jacq.*) Pada Tikus yang diinduksi Siklofosfamid. *Skripsi*, Volume Fakultas Syariah. Universitas Sumatera Utara .
- Nafiqoh , N. & Jasmanindar, Y., 2021. Pengamatan Eritrosit Dan Leukosit Pada Ikan Gurami (*Osphronemus gourami*) Yang Menerima Perlakuan Tanaman

- Herbal Dan Infeksi Mycobacterium Fortuitum. *Jurnal Aquatik*, Volume 04(02), pp. 65-72.
- Nafisah, R. et al., 2023. The Effect of Fermentation Time on Phenolic Levels of Vanilla. *ICOSHPRO*, pp. 212-221.
- Naland, H., 2008. *Kombucha Teh Dengan Seribu Khasiat*. Jakarta: Agromedia.
- Nanjo, F., Morim, M., Goto, K. & Hara, Y., 1999. Radical Scavenging Activity of Tea Catechins and Their Related Compounds. *Bioscience*, Volume 63 (09), pp. 1621-1623.
- Ndiaye, M. A., Nihal, M., Wood, G. & Ahmad, N., 2014. Skin, Reactive Oxygen Species, and Circadian Clocks. *Antioxidants & REdox Signaling*, Volume 20 (18), pp. 10-18.
- Ningsih, D. & Zufahair, K., 2016. Identifikasi Senyawa Metabolit Sekunder serta Uji Aktivitas Ekstrak Daun Sirsak sebagai Antibakteri. *Jurnal Molekul*, Volume 11(01), pp. 101-111.
- Nisak, Y., Nurbaya, S. & Nurhayati, A., 2023. Fermentasi Kombucha: Teknologi dan Manfaat Kesehatan. *Nizamia Leraning Journal*, pp. 01-10.
- Noer, S., Pratiwi, R. & Gresinta, E., 2018. Penetapan Kadar Senyawa Fitokimia (Tanin, Saponin Dan Flavonoid Sebagai Kuersetin) Pada Ekstrak Daun Inggu (*Ruta angustifolia* L.). *Jurnal Ilmu - Ilmu Mipa*, Volume 18(01), pp. 19-29.
- Noer, S., Rosa, D. & Efri, G., 2018. Penetapan Kadar Senyawa Fitokimia (Tanin, Saponin Dan Flavonoid Sebagai Kuersetin) Pada Ekstrak Daun Inggu (*Ruta angustifolia* L.). *Jurnal Eksata*, Volume 24(01), pp. 1411-147.
- Norantika, B., 2024. .. Formulasi Masker Organik Antioksidan Serbuk Daun Teh Hijau (*Camellia Sinensis*) Dengan Kombinasi Basis Gel (Doctoral dissertation. Skripsi. Fakultas Ilmu Kesehatan. *Skripsi*, Volume Fakultas Ilmu Kesehataan. Universitas Bharmaslawi. Tegal .
- Noriko, N., 2013. Potensi Daun Teh (*Camellia sinensis*) dan Daun Anting - Anting *Acalphaindica* L. dalam Menghambat Pertumbuhan *Salmonellatyphi*. *Jurnal Al - Azhar Indonesian Seri Sains dan Teknologi*, Volume 02(02), pp. 104-110.
- Novitasari, A. E. & Dinda, Z. P., 2016. Isolasi dan Identifikasi Saponin pada Ekstrak Daun Mahkota Dewa dengan Ekstraksi Maserasi. *Jurnal Sains*, Volume 06(12), pp. 10-14.
- Nugraha, G. & Badrawi, L., 2018. *Pedoman Teknik Pemeriksaan Laboratorium Klinik*. Jakarta: Trans Info Media Jakarta .

- Nugrahani, R., Andyani, Y. & Hakim, A., 2016. Skrining Fitokimia dari Ekstrak Buah Buncis (*Phaseolus vulgaris* L) dalam Sediaan Serbuk. *Jurnal Penelitian Pendidikan*, Volume 02(01), pp. 01-08.
- Nur , M., Bristi , N. & Rafiquzzaman M.D, 2013. On Vivo and Vitro Methods Evaluation of Antioxidant Activity. *Saudi Pharmaceutical Journal*, Volume 21, pp. 143-152.
- Nuraeni, Y. & Wida, D., 2021. Pemanfaatan Metabolit Sekunder Tumbuhan sebagai Pestisida Nabati pada Tanaman Hutan. *Jurnal Galam*, Volume 02(01), pp. 01-15.
- Nurfutriani, Zainuddin, A. & Malago, Y., 2025. Pengaruh waktu Fermentasi Teh Kombucha Terhadap Kadar Antioksidan sebagai Minuman Probiotik. *Jurnal sains dan Teknologi Hasil Pertanian* , Volume 05(01), pp. 50-63.
- Nurhayati , N., Yuwanti , S. & Urbahillah , A., 2020. “Karakteristik Fisikokimia Dan Sensori Kombucha Cascara (Kulit Kopi Ranum). *Jurnal Teknologi dan Industri Pangan* , Volume 31(01), pp. 38-49.
- Nurikasari , M., Puspitasari , Y. & Palupi , R., 2017. Characterization and Analysis Kombucha Tea Antioxidant Activity Based on Long Fermentation As a Beverage Functional. *Journal of Global Research in Public Health* , Volume 02(02), pp. 48-52.
- Nurikasari, M., Pupitasari, Y. & Silwi, R., 2017. Characterization and Analysis Kombucha Tea Antioxidant Activity Based on Long Fermentation as a Beverage Functional.. *Journal of Global Research in Public Health*, Volume 02(02), pp. 48-52.
- O’Connell, K.E. *dkk.* (2015) “Practical murine hematopathology: a comparative review and implications for research,” *Comparative medicine*, 65(2), hlm. 96–113.
- Ouyang, J. *dkk.* (2020) “Prooxidant effects of epigallocatechin-3-gallate in health benefits and potential adverse effect,” *Oxidative medicine and cellular longevity*, 2020(1), hlm. 9723686.
- Pagaya, J. & Que, B. J., 2017. Respon Imun Seluler dan Humoral Terhadap Infeksi HIV. *Molucca Medica*, pp. 41-49.
- Patra, A.K. dan Saxena, J. (2009) “The effect and mode of action of saponins on the microbial populations and fermentation in the rumen and ruminant production,” *Nutrition Research Reviews*. 2009/12/11, 22(2), hlm. 204–219. Tersedia pada: <https://doi.org/10.1017/S0954422409990163>.
- Palmer, D. & Kitchin, J., 2010. Oxidative damage, skin aging, antioxidants and a novel antioxidant rating system. *J Drugs Dermatol. Journal Drugs Dermatol*, Volume 09(01), pp. 11-15.
- Panche, A. N., Diwan, A. D. & Chandra, S. R., 2016. Flavonoid An Overview. *Journal of Nutritional Science*, Volume 05(01), p. 01(10).

- Pebru, H. P. & Fania, P., 2021. Kajian Literatur Aktivitas Imunomulator Daun Teh Hijau (*Camellia sinensis* L.). *Thesis*, Volume Universitas Ngudi Waluyo .
- Prasthio, R., Yohannes, Y. & Devella, S., 2022. Penggunaan Fitur HOG dan HSV untuk Klasifikasi Citra Sel Darah Putih. *Jurnal Algoritme*, Volume 02(02), pp. 120-132.
- Pratt, D., 1992. *Natural Antioxidants from Plant Material. In Phenolic Compounds in Food and Their Effects on Health*. Washington DC: ACS Symposium Series.
- Puertollano, M. A., Puertollano, E., de Cienfuegos, G. A. & de Pablo, M. A., 2011. Dietary antioxidants: Immunity and Host Defense. *Current Topics in Medicinal Chemistry*, Volume 11 (14), pp. 1752-1766.
- Purwaningtyas, Y. R. & Cahyaningtyas, Y. D., 2024. Effect of Long Fermentation to Titrated Acid Total (TAT) in Lemongrass Kombucha Tea (*Cymbopogon citratus* (DC.) Stapf.). *International Journal of Health Sciences and Research*, Volume 14(04), pp. 112-118.
- Puspitasari, Y., Palupi, R. & Nurikasari, M., 2017. Analisis Kandungan Vitamin C Teh Kombucha berdasarkan lama fermentasi sebagai Alternatif Minuman untuk Antioksidan. *Global Health Science*, Volume 02(03), pp. 245-253.
- Putri, M. P., Sitasiwi, A. J., Isdadiyanto, S. & Mardati, S. M., 2023. Profil Leukosit Tikus Jantan (*Rattus novergicus* L.) Galur Sprague Dawley setelah Paparan. *Jurnal Sains Veteriner*, Volume 41 (01), pp. 29-36.
- Putri, F. M., Sitawisi, A. J., Isdadiyanto, S. & Mardati, S., 2023. Profil Leukosit Tikus Jantan (*Rattus novergicus* L.) Galur Sprague Dawley setelah Paparan Nanokitosan Ekstrak Etanol Daun Mimba (*Azadirachta indica* A. Juss.). *Jurnal Sains Veteriner*, Volume 41(01), pp. 29-36.
- Putri, P., Chatri, M. & Advinda, L., 2023. Karakteristik Saponin Senyawa Metabolit Sekunder pada Tumbuhan. *Jurnal Serambi Biologi*, Volume 08(02), pp. 252-256.
- Ramirez, G.A. dkk. (2018) "Eosinophils from physiology to disease: a comprehensive review," *BioMed research international*, 2018(1), hlm. 9095275.
- Rahayu, R. et al., 2018. The Immunomodulatory Effect Of Green Tea *Camellia sinensis* leaves extract on immunocompromised Wistar rats infected by *Candida albicans*. *Vet World*, Volume 11(06), pp. 765-7770.
- Rahmah, M., Nurfila & Sari, A., 2022. Total Phenol and Total Flavonoid of Graded Fractination Fresh and Dried *Muntingia calabura* Extract: A Sustainable Immunomodulator Bioagent for Functional Health Drink. *Jurnal Pembelajaran dan Biologi Nukleus*, Volume 08(03), pp. 767-780.

- Rahmatullah , et al., 2021. Teh Fermentasi Menggunakan Starter Kombucha dengan Tambahan Sari Buah Organik sebagai Solusi Hidup Sehat. *Prosiding Seminar Nasional*, pp. .Universitas Sriwijaya, Palembang.
- Ramlah, R., 2017. Penentuan Suhu dan Waktu Optimum Penyeduhan Daun Teh Hijau (*Camellia Sinensis* L) P+ 2 Terhadap Kandungan Antioksidan Kafein, Tanin dan Katekin. *Skripsi*, Volume Fakultas Sains dan Teknologi. Universitas Islam Negeri Alauddin Makasar. Makasar.
- Rastuti , U. & Purwati, 2012. Uji aktivitas antioksidan ekstrak daun kalba (*Albizia falcata*) dengan metode DPPH (1,1-Difenil-2-pikrilhidrazil) dan identifikasi senyawa metabolit sekundernya. *Molekul* , Volume 07(01), pp. 33-42.
- Reiss, J., 1994. Influence of Diffrenct Sugars on The Metabolisme of The Tea Fungus. *Journal Forschung*, Volume 198(03), pp. 258-261.
- Rietveld, A. & Wiesman, S., 2003. Antioxidant effects of tea, evidence from human clinical trials. *The American Society for Nutritional Sciences Journal Nutritions*, Volume 133, pp. 3852-3860.
- Rodax , B. & Carr, J., 2017. Erythrocytes, In : Clinical Hematology Atlas, 5 Th Edition. *Elsevier*, pp. 89-130.
- Rosyada , F., 2022. Pengaruh Waktu Fermentasi dan Konsentrasi Terhadap Karakteristik Fisika, Kimia, dan Aktivitas Antioksidan Teh Kombucha Daun Belimbing Wuluh (*Avverhoa bilimbi*. Linn). *Skripsi*, Volume 01-103.
- Rozniar, Erniani, K., Ramli, I. & Muliani, F., 2015. Uji Efek Imunostimulan Buah Kurma (*Phoenix dactylifera*) Pada Mencit Jantan (*Mus musculus*) Galur Balb/c. *Prosiding Seminar Nasional Biotik*, pp. 292-297.
- Agathokleous, E. dan Calabrese, E.J. (2020) “A global environmental health perspective and optimisation of stress,” *Science of the Total Environment*, 704, hlm. 135263.
- Anderson, G.A., Rodriguez, M. dan Kathrein, K.L. (2020) “Regulation of stress-induced hematopoiesis,” *Current opinion in hematology*, 27(4), hlm. 279–287.
- Andrade, E.D.S. dkk. (2024) “Immunomodulatory Effects of Green Tea Catechins and Their Ring Fission Metabolites in a Tumor Microenvironment Perspective,” *Molecules*, 29(19), hlm. 4575.
- Andrés, C.M.C. dkk. (2023) “Polyphenols as antioxidant/pro-oxidant compounds and donors of reducing species: Relationship with human antioxidant metabolism,” *Processes*, 11(9), hlm. 2771.
- Antolak, H., Piechota, D. dan Kucharska, A. (2021) “Kombucha tea—A double power of bioactive compounds from tea and symbiotic culture of bacteria and yeasts (SCOBY),” *Antioxidants*, 10(10), hlm. 1541.

- Baddam, S. dan Burns, B. (2025) "Systemic Inflammatory Response Syndrome.," *StatPearls [Internet]*; StatPearls Publishing: Treasure Island, FL, USA [Preprint].
- Basyreva, L. dkk. (2021) "Effect of Vitamin D3 in combination with Omega-3 Polyunsaturated Fatty Acids on NETosis in Type 2 Diabetes Mellitus Patients," *Oxidative Medicine and Cellular Longevity*, 2021. Tersedia pada: <https://doi.org/10.1155/2021/8089696>.
- Clauss, M. (2012) "Clinical Technique: Feeding Hay to Rabbits and Rodents," *Journal of Exotic Pet Medicine*, 21(1), hlm. 80–86. Tersedia pada: <https://doi.org/10.1053/j.jepm.2011.11.005>.
- Clauss, T., Dove, A. dan Arnold, J. (2008) "Hematologic disorders of fish," *Veterinary Clinics of North America Exotic Animal Practice*, 11, hlm. 445–462.
- Ding, S., Jiang, H. dan Fang, J. (2018) "Regulation of immune function by polyphenols," *Journal of immunology research*, 2018(1), hlm. 1264074.
- Fadhilah, Z.H., Perdana, F. dan Syamsudin, R.A.M.R. (2021) "Telaah kandungan senyawa katekin dan Epigallocatekin Galat (EGCG) sebagai antioksidan pada berbagai jenis teh," *Jurnal Pharmascience*, 8(1), hlm. 31–44.
- Fahrimal, Y. dkk. (2015) "PROFIL DARAH TIKUS PUTIH (*Rattus norvegicus*) YANG DIINFEKSIKAN *Trypanosoma evansi* DAN DIBERIKAN EKSTRAK KULIT BATANG JALOH (*Salix tetrasperma* Roxb)," *Jurnal Kedokteran Hewan - Indonesian Journal of Veterinary Sciences*, 8. Tersedia pada: <https://doi.org/10.21157/j.ked.hewan.v8i2.2653>.
- Ghutama, B.S., Maharani, I. dan Wirattami, A.T. (2025) "HUBUNGAN RINITIS ALERGI DENGAN OTITIS MEDIA EFUSI," *Malang Otorhinolaryngology Head and Neck Surgery Journal*, 4(2), hlm. 9–16.
- Godlewska, K. dkk. (2023) "Investigation of chemical constituents and antioxidant activity of biologically active plant-derived natural products," *Molecules*, 28(14), hlm. 5572.
- Habiburrohmah, D. dan Sukohar, A. (2018) "Aktivitas antioksidan dan antimikrobia pada polifenol teh hijau," *Jurnal Kesehatan dan Agromedicine*, 5(02), hlm. 587–591.
- Halliwel, B. (2013) "The antioxidant paradox: less paradoxical now?," *British journal of clinical pharmacology*, 75(3), hlm. 637–644.
- Holderness, J. dkk. (2008) "Response of $\gamma\delta$ T cells to plant-derived tannins," *Critical ReviewsTM in Immunology*, 28(5).
- Jakubczyk, K. dkk. (2020) "Chemical profile and antioxidant activity of the kombucha beverage derived from white, green, black and red tea," *Antioxidants*, 9(5), hlm. 447.
- Jodynys-Liebert, J. dan Kujawska, M. (2020) "Biphasic dose-response induced by phytochemicals: experimental evidence," *Journal of Clinical Medicine*, 9(3), hlm. 718.

- Jones, M.P. (2015) "Avian Hematology," *Veterinary Clinics of North America: Exotic Animal Practice*, 18(1), hlm. 51–61. Tersedia pada: <https://doi.org/10.1016/j.cvex.2014.09.012>.
- Kim, Y.H. dkk. (2016) "Green tea catechin metabolites exert immunoregulatory effects on CD4+ T cell and natural killer cell activities," *Journal of agricultural and food chemistry*, 64(18), hlm. 3591–3597.
- Lai, Y. dkk. (2025) "In vitro fermentation characteristics and prebiotic activity of herbal polysaccharides: a review," *Frontiers in Nutrition*, 12, hlm. 1687766.
- Latief, M. dkk. (2021) "ANTI INFLAMMATORY ACTIVITY OF SUNGKAI LEAVES (*Peronema canescens* JACK) ETHANOL EXTRACT IN CARRAGEENAN INDUCED MICE," *Jurnal Farmasi Sains dan Praktis*, 7, hlm. 144–153. Tersedia pada: <https://doi.org/10.31603/pharmacy.v7i2.4532>.
- Li, D. dkk. (2024) "The roles of epigallocatechin gallate in the tumor microenvironment, metabolic reprogramming, and immunotherapy," *Frontiers in immunology*, 15, hlm. 1331641.
- Li, W. dkk. (2015) "EGCG induces G-CSF expression and neutrophilia in experimental sepsis," *Immunologic research*, 63(1), hlm. 144–152.
- Lowe, G.M., Gana, K. dan Rahman, K. (2015) "Dietary supplementation with green tea extract promotes enhanced human leukocyte activity," *Journal of Complementary and Integrative Medicine*, 12(4), hlm. 277–282.
- Maghfirah, D., Pulungan, A., dkk. (2025) "Perbandingan Kandungan Fenolik dan Aktivitas Antioksidan pada Varian Seduhan Teh dan Varian Teh Kombucha Secara Spektrofotometri Visible," *Journal of Pharmaceutical and Sciences*, hlm. 1384–1397. Tersedia pada: <https://doi.org/10.36490/journal-jps.com.v8i3.952>.
- Maghfirah, D., Pulungan, A.F., dkk. (2025) "Perbandingan Kandungan Fenolik dan Aktivitas Antioksidan pada Varian Seduhan Teh dan Varian Teh Kombucha Secara Spektrofotometri Visible," *Journal of Pharmaceutical and Sciences*, hlm. 1384–1397.
- Maharani, S. (2025) "Literature Review: The Potential of Tea as an Immunomodulator Through Its Antioxidant and Anti-Inflammatory Properties," *Antigen : Jurnal Kesehatan Masyarakat dan Ilmu Gizi*, 3, hlm. 135–145. Tersedia pada: <https://doi.org/10.57213/antigen.v3i3.738>.
- Marina, A.-D., Lorena, F. dan Marc, R. (2024) "Camellia sinensis L. (Green Tea): Bioactive Compounds and Pharmacological Properties – A Comprehensive Review," *Hop and Medicinal Plants*, 32, hlm. 102–118. Tersedia pada: <https://doi.org/10.15835/hpm.v32i1-2.15020>.
- Martihandini, N. dan Rochimat, I. (2024) "Characteristics of four variants of kombucha tea as candidate of functional health drink," *Jurnal Mandala Pharmacon Indonesia*, 10(1), hlm. 227–237.
- Martínez Leal, J. dkk. (2018) "A review on health benefits of kombucha nutritional compounds and metabolites," *CyTA-Journal of Food*, 16(1), hlm. 390–399.

- Mazrouh, M.M. dkk. (2015) "Some Haematological Parameters and Blood Picture of *Oreochromis niloticus* in Manzalah Lake, Egypt," *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)* e-ISSN, hlm. 2319–2402.
- Mitroulis, I. dkk. (2020) "Regulation of the bone marrow niche by inflammation," *Frontiers in immunology*, 11, hlm. 1540.
- Musial, C., Kuban-Jankowska, A. dan Gorska-Ponikowska, M. (2020) "Beneficial properties of green tea catechins," *International journal of molecular sciences*, 21(5), hlm. 1744.
- Nasution, H. dan Situmorang, R. (2022) "ANALISIS BIOAUTOGRAFI DAN UJI AKTIVITAS ANTIBAKTERI EKSTRAK ETANOL DAUN MENGGUDU (*Morinda citrifolia* L.) TERHADAP BAKTERI *Propionibacterium acne*," *JURNAL FARMANESIA*, 9, hlm. 16–21. Tersedia pada: <https://doi.org/10.51544/jf.v9i1.3424>.
- Nurikasari, M., Puspitasari, Y. dan Siwi, R.P.Y. (2017) "Characterization and analysis kombucha tea antioxidant activity based on long fermentation as a beverage functional," *Journal of Global Research in Public Health*, 2(2), hlm. 48–52.
- Nyhan, L.M. dkk. (2022) "Advances in kombucha tea fermentation: A review," *Applied Microbiology*, 2(1), hlm. 73–103.
- O'Connell, K.E. dkk. (2015) "Practical murine hematopathology: a comparative review and implications for research," *Comparative medicine*, 65(2), hlm. 96–113.
- Ouyang, J. dkk. (2020) "Prooxidant effects of epigallocatechin-3-gallate in health benefits and potential adverse effect," *Oxidative medicine and cellular longevity*, 2020(1), hlm. 9723686.
- Van Panhuys, N. dkk. (2011) "Basophils are the major producers of IL-4 during primary helminth infection," *The Journal of Immunology*, 186(5), hlm. 2719–2728.
- Patra, A.K. dan Saxena, J. (2009) "The effect and mode of action of saponins on the microbial populations and fermentation in the rumen and ruminant production," *Nutrition Research Reviews*. 2009/12/11, 22(2), hlm. 204–219. Tersedia pada: <https://doi.org/10.1017/S0954422409990163>.
- Ramirez, G.A. dkk. (2018) "Eosinophils from physiology to disease: a comprehensive review," *BioMed research international*, 2018(1), hlm. 9095275.
- Saeki, K. dkk. (2018) "In vitro and in silico studies of the molecular interactions of epigallocatechin-3-O-gallate (EGCG) with proteins that explain the health benefits of green tea," *Molecules*, 23(6), hlm. 1295.
- Sannapaneni, S. dkk. (2023) "Kombucha-Induced Massive Hepatic Necrosis: A Case Report and a Review of Literature," *Gastro Hep Advances*, 2(2), hlm. 196–198. Tersedia pada: <https://doi.org/10.1016/j.gastha.2022.09.014>.

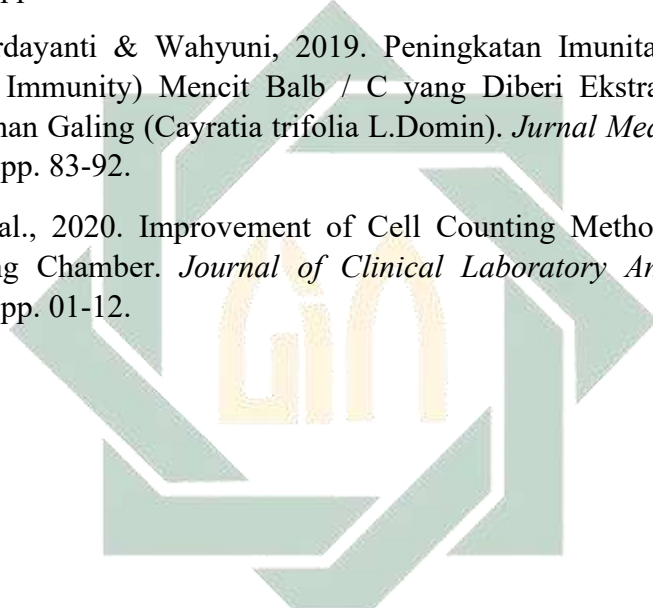
- Selvaraj, S. dan Gurumurthy, K. (2023) "An overview of probiotic health booster-kombucha tea," *Chinese Herbal Medicines*, 15(1), hlm. 27–32. Tersedia pada: <https://doi.org/10.1016/j.chmed.2022.06.010>.
- Senchina, D.S. dkk. (2014) "Alkaloids and athlete immune function: caffeine, theophylline, gingerol, ephedrine, and their congeners.," *Exercise immunology review*, 20.
- Sudisma, I.G.N. dkk. (2025) "An analysis of secondary metabolites and anesthetic potential of datura flower extract (*Datura metel* L.)," *Adv. Anim. Vet. Sci*, 13(7), hlm. 1597–1605.
- Salman, Y., Nadia, N. & Wahidah, R., 2021. Perbedaan Hasil Hitung Jumlah Leukosit Dengan Modifikasi Air Perasan Jeruk Nipis (*Citrus Aurantifolia* Swingle) Dan Asam Cuka Sebagai Pengganti Komposisi Larutan Turk. *Jurnal Kesehatan Indonesia*, Volume 12(01), pp. 12-15.
- Samuelson, D., 2007. Textbook of Veterinary Histology. *Elsevier*.
- Sanfacon, R., Roulliard, R. & Heick, H., 1976. The Accumulation of Succinate by The Yeast *Brettanomyces bruxellensis*. *Canadian Journal of Microbiology*, Volume 213-220, p. 22(02).
- Saragi, D., Nasution, L. & Permata, Y., 2023. The Effect Fermentation Time Variation on Antioxidant Activity of Fermented Robusta Coffe Leaves (*Coffe canephora*) Pierre ex A. Froehner) Brew. *Indonesian Journal of Pharmaceutical and Clinical Research* , Volume 06(02), pp. 19-25.
- Sari, P. & Nurbidayah, 2021. Perbandingan Efektivitas Air Perasan Jeruk Nipis Dan Air Perasan Lemon Sebagai Reagen Alternatif Pengganti Larutan Turk Untuk Hitung Jumlah Leukosit. *Jurnal Ergasterio*, Volume 08(02), pp. 01-10.
- Sayuti , K. & Rina, Y., 2015. *Antioksidan Alami dan Sintetik*. Padang : Andalas University Press.
- Sayuti , K. & Yenrina , R., 2015. *Antioksdian Alami dan Sintetik*. 1 penyunt. Padang: Andalas University Press.
- Selvaraj, S. & Gurumurthy, K., 2024. Metagenomic, Organoleptic profiling, and Nutritional Properties of Fermented Kombucha Tea Substituted with Recycled Substrates. *Frontier in Microbiology*, pp. 01-19.
- Sentkowska, A., 2021. Content of selenoaminoacids and catechins in Chinese green teas. *European Food Research and Technology Journal* , Volume 247, pp. 613-622.
- Shanti, I. A. S., Santa , A. & Hadi, F., 2020. Pengaruh Perbandingan Pengenceran Giemsa 5%, 10%, dan 20 % Terhadap Morfologi Leukosit pada Pemeriksaan Hapusan Darah Tepi. *Stikes Bali*, Volume 01(02), pp. 01-07.

- Sharma, V. & Venkataramani, K., 1974. *The Tea Complex: Taxonomy of tea Clones*. South India: UPASI Tea Research Station.
- Sherwood, L., 2012. *Fisiologi Manusia dari Sel ke Sistem*. 6 penyunt. Jakarta: Buku Kedokteran.
- Shofiyya, A. et al., 2023. The Effect Of Fermentation Time On Alcohol Content, Chemical Characteristic, And Halal Label Of Vanilla (*Vanilla planifolia*) Leaf Kombucha Tea. *ICOSHPRO*, pp. 09-15.
- Siddiqui , N., Rauf , A., Latif, A. & Mahmood , z., 2017. Spectrophotometric Determination of The Total Phenolic Content, Spectral, and Fluorescence of The Herbal Unani Drug Gul- e- zoofa (*Nepeta Bracteata Benth*). *Journal of Taibah University Medical Sciences*, Volume 12(04), pp. 360-363.
- Silvyna, A. E., Rahayu, F., Warti, L. & Prasetyo, F., 2023. Evaluasi Pemberian Fermentasi Teh Kombucha Rosella (*Hibiscus sabdariffa* L.) sebagai Imunomodulator pada Mencit Putih Jantan secara In Vivo. *Jurnal Ayuverda Medistra* , Volume 05(01), pp. 07-12.
- Smith & Mangkoewidjojo, 1988. *Pemeliharaan, Pembiakan, Dan Penggunaan Hewan Percobaan di Daerah Tropis*. Jakarta : Universitas Indonesia .
- Sopandi , T. & Wardah , A., 2014. *Mikrobiologi Pangan, Teori, dan Praktik*. Yogyakarta: Andy Offset Press.
- Steinkraus, K., 2002. Fermentations in world food processing. *Comprehensive. Journal Food Science and Food Safety*, Volume 01(01), pp. 23-32.
- Subandi , B. M., Zurimi, S., Tualeka, A. R. & Puspitaloka, N. B., 2024. Efek Asupan Antioksidan Kaya Enzim Cytochrome P4502E1 (CYP2E1) Terhadap Kadar Leukosit.. *Jurnal Media Kesehatan Politeknik Makassar*, Volume 19 (02), pp. 200-211.
- Subowo, 2009. *Imunologi*. Jakarta: Sagung Seto.
- Subowo, 2014. *Imunobiologi*. Jakarta : Sagung Seto .
- Suhardini, P. & Zubaidah, E., 2016. Studi Aktivitas Antioksidan Kombucha dari Berbagai Jenis Daun Selama Fermentasi. *Jurnal Pangan dan Agroindustri* , Volume 04 (01), pp. 221-229.
- Suhirman, S., 2012. Teh Kombucha sebagai Minuman Fungsional untuk Meningkatkan Daya. *Jurnal Penelitian dan Pengembangan Tanaman Industri*, Volume 18 (02), pp. 26-30.
- Sukmawati , P., Ramona, Y. & Leliqia, N., 2013. Penetapan Aktivitas Antioksidan yang Optimal pada Teh hitam Kombucha Lokal di Bali dengan Variasi Waktu Fermentasi. *Jurnal Farmasi Udayana* , Volume 02(01), pp. 25-29.

- Sulistiaawaty , L. & Solihat, I., 2022. Kombucha: Fisikokimia dan Studi Kritis Tingkat Kehalalan. *Jurnal Warta Akab*, Volume 46(01), pp. 21-27.
- Sunghhee, K., Jones, H., Christensen, R. & Gladstein, J., 2009. A Case of Kombucha Tea Toxicity. *Journal Intensive Care Med*, pp. 01-07.
- Suprihatini, R. et al., 2021. *Teh Camellia sinensis Indoensia Lebih Menyehatkan*. Bandung: PT Riset Perkebunana Nusantara.
- Takahashi, A., Watanabe, T. & Mondal, A., 2014. Mechanism based inhibition of cancer metastasis with (-)- epigallocatechingallate. *Biochem and Biphyskcal Research Communications*, Volume 443(01), pp. 01-06.
- Terry, P. et al., 2001. Fruit and Vegetable Consumption in The Prevention of Oesophageal and Cardia Cancers. *European Journal of Cancer Prevention*, Volume 10(04), pp. 365-369.
- Trang, T.-T. et al., 2023. Characteristics and Relationships between Total Polyphenol and Flavonoid Contents, Antioxidant Capacities, and the Content of Caffeine, Gallic Acid, and Major Catechins in Wild/Ancient and Cultivated Teas in Vietnam. *Molecules*, Volume 28, pp. 01-17.
- Tripathi , R., 2014. Integrated Management of Rodent Pests. *Elsevier*, pp. 419-459.
- Tsimogiannis , D. & Oreopoulou, V., 2019. Classification of Phenolic Compounds in Plants. *In Polyphenols in Plants* , pp. 263-284.
- Ula, A., 2018. . Pengaruh Pemberian Ekstrak Daging Buah Kurma Ajwa (Phoenix Dactylifera L.) Terhadap Kadar Hemoglobin Pada Mencit (Mus Musculus) Bunting. *Skripsi*, Volume Fakultas Sains dan Teknologi, Universitas Islam Negeri Sunan Ampel Surabaya, Surabaya.
- Villarreal- Soto , S. et al., 2018. Understanding Kombucha Microbiology. *Compre. Rev. Food. Sci. Food. Saf*, Volume 83(03), pp. 580-588.
- Van Panhuys, N. dkk. (2011) “Basophils are the major producers of IL-4 during primary helminth infection,” *The Journal of Immunology*, 186(5), hlm. 2719–2728.
- Washington, I.M. dan Van Hoosier, G. (2012) “Clinical biochemistry and hematology,” dalam *The laboratory rabbit, guinea pig, hamster, and other rodents*. Elsevier, hlm. 57–116.
- Wei, L. dkk. (2023) “Fermentation improves antioxidant capacity and γ -aminobutyric acid content of Ganmai Dazao Decoction by lactic acid bacteria,” *Frontiers in Microbiology*, 14, hlm. 1274353.
- Wahdaningsih, S., Setyowati, E. & Wahyono, S., 2011. Aktivitas Penangkap Radikal Bebas dari Baang Pakis (Alsophila gluca J.SM). *Jurnal Sains*, Volume 16(03), pp. 156-160.

- Wahid, A. & Purwaganda, W., 2015. Jurnal Ilmu-ilmu Kesehatan. *Jurnal Kesehatan Rajawali* , Volume 05(09), pp. 02-06.
- Wahsington, Ida, M. & Gerald, V., 2012. Clinical Biochemistry and Hematology. *Elsevier*, pp. 59-112.
- Wahyuni, S. & Marpaung, M., 2020. Penentuan Kadar Alkaloid Total Ekstrak Akar Kuning (*Fibraurea chloroleuca* Miers) Berdasarkan Spektrofotometri Uv-Vis.. *Jurnal Pendidikan Kimia dan Ilmu Kimia* , Volume 03(02), pp. 052-61.
- Wahyuni, W., Malaka, Fristiohady, Y. & Sahidin, 2017. Potensi Imunomodulator Ekstrak Etanol Buah Kecombrang (*Etlingera elatior* (Jack) RM Smith) Terhadap Aktivitas Fagositosis Makrofag Mencit Jantan Galur BALB/C. *Jurnal Pharmacon*, Volume 06(03), pp. 01-10.
- Wang , J., Gusti, V., Saraswati, A. & Lo, D., 2011. Convergent and Divergent Development Among M cell Lineages in Mouse Mucosal Epithelium. *The Journal of Immunology*, Volume 187(10), pp. 5277-5285.
- Wardhani , R. R. A. A. K., Akhyar, O. & Prasiska, E., 2018. Skrining Fitokimia, Aktivitas Antioksidan, dan Kadar Total Fenol - Flavonoid Ekstrak Daun dan Buah Tanaman Galam Rambut (*Malaleuca cajuputi* ROXB). *Jurnal Inovasi Pendidikan Sains*, Volume 9 (02), pp. 133- 143.
- Wibisono , Y. et al., 2020. Ekstraksi Senyawa Fenolik Dari Bawang Putih (*Allium Sativum* L.) Untuk Agen Anti-Biofouling Pada Membran.. *Jurnal Ilmiah Rekayasa Pertanian dan Biosistem* , Volume 08(01), pp. 100-109.
- Wibowo, N. K., Rudyanto, M. & Purwanto, D. A., 2022. Aktivitas Antioksidan Teh Hijau dan Teh Hitam. *Clinical, Pharmaceutical, Analytical, and Pharmacy Community Journal*, Volume 01 (02), pp. 48-55.
- Wibowo, S. G. et al., 2024. Pelatihan Pembuatan Teh Probiotik Kombucha Hasil Fermentasi SCOBY sebagai Diversifikasi Pangan Fungsional di Langsa Baro, Aceh. *Jurnal Pengabdian Pada Masyarakat*, Volume 9 (2), pp. 542-548.
- Widarta, I., Suter, I., Yusa, N. & Arisandhi, P., 2015. *Penuntun Praktikum Analisis Pangan*. Bali: Universitas Udayana. Denpasar .
- Wideosari, E., 2007. Peranan Imunomodulator Alami (*Aloe vera*) Dalam Sistem Imunitas Seluler dan Humoral. *Jurnal Wartazoa*, Volume 17(04), pp. 165-171.
- Widiawati & Qodri , U., 2023. Anlisis Fitokimia dan Penentuan Kadar Fenolik Total pada Ekstrak Etanol Tebu Merah dan Tebu Hijau (*Saccharum Officinarum* L.). *Jurnal Farmasi Tinctura*, Volume 04(02), pp. 91-102.

- Wistiana , D. & Zubaidah, E., 2015. Karakteristik Kimiawi dan Mikrobiologis Kombucha dari Berbagai Daun Tinggi Fenol Selama Fermentasi. *Jurnal Pangan dan Agroindustri*, Volume 09(02), pp. 1446 - 1457.
- Wulan, I. & Agusni, I., 2015. Penggunaan Imunomodulator Untuk Berbagai Infeksi Virus Pada Kulit (Immunomodulators for a Variety of Viral Infections of The Skin). *Berkala Ilmu Kesehatan Kulit dan Kelamin. Jurnal Periodical of Dermatology and Venerology* , Volume 27(01), pp. 63-39.
- Yanuartono, H., Purmaningsih, A., Nururrozi & Indrajulianto, S., 2017. Saponin: Dampak terhadap Ternak (Ulasan).. *Jurnal Peternakan Sriwijaya* , Volume 06(02), pp. 79-90.
- Yusuf, M., Firdayanti & Wahyuni, 2019. Peningkatan Imunitas Non Spesifik (Innate Immunity) Mencit Balb / C yang Diberi Ekstrak Etanol Daun Tumbuhan Galing (*Cayratia trifolia* L.Domin). *Jurnal Med Sains*, Volume 03(02), pp. 83-92.
- Zhang, M. et al., 2020. Improvement of Cell Counting Method for Neubauer Counting Chamber. *Journal of Clinical Laboratory Analysis*, Volume 34(01), pp. 01-12.



UIN SUNAN AMPEL
S U R A B A Y A