

ORIGINAL ARTICLE

A comparative assessment of chemical characteristics of goat's milk yoghurt after the addition of *Syzygium cumini* L.

Endah Budi Permana Putri, Refintia Dinda Rozaki

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Determination of total phenol and total flavonoid, and antioxidant activities of chocolate leaves (*Zephyranthes candida* (Lindl.) Herb.)

Noviyanti, Isye Martiani, Farid Perdana, Rahmaniah

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The association between hypoxia-inducible factor 1 α tissue concentration and the risk of amputation in diabetic foot ulcer patients

Patrianef Darwis, Em Yunir, Aria Kekalih, Akhmadu Muradi, Sri Widia Jusman, Hendro Sudjono Yuwono, Suseetyo Hari Purnomo

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Identification of molecular compound Africa leave (*Vernonia* sp.) ethanol extra with the phytochemical screening method

Martha Marie Kaseke, Fatimawali, Septyano Sondakh

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Application of failure mode effect analysis on hazard identification and risk control

Ratna Ayu Ratriwardhani, Merry Sunaryo, Octavianus Hutapea, Muslikha Nourma Rhomadhoni

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Nomophobia: A new disease epidemic among students during the era of online learning

Endang Sulistiyani, Sasmi Hidayatul Yulianing Tyas, Muhamad Novanuari, Muhammad Rizqi Dwisapta

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Associations between sociodemographic and level of knowledge, attitudes and practices towards COVID-19 among nursing students of University Malaysia Sabah, Malaysia

Abdul Rahman Ramdzan, Danish Shazrein Binti Kaslan, Mohd Nurman Bin Aman Setia, Don Harris Bin Sundang, Hetrice Hunsoi, Rachel Chin Zin Yun, Tan Ker Xin, Mohana A/P Saran, Zulkhairul Naim Bin Sidek Ahmad

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Microbial blood culture patterns and antibiotic susceptibility in pediatric febrile neutropenia at Sanglah General Hospital Bali

Kartika Eda Clearesta, I Wayan Gustawan, Ketut Ariawati, Ni Nengah Dwi Fatmawati, Made C Dwi Lingga Utama, Anak Agung Ngurah Ketut Putra Widnyana, Kadek Ayu Yani Lastariana

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The effect of boxing exergame on blood lactate and VO₂max in non-athlete healthy young men

Fairuz Silvi, Raden Ayu Meisy Andriana, Indrayuni Lukitra Wardhani, Yudith Dian Prawitri, Inggar Narasinta, Soenarnatalina Melaniani

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Baby delivery development by one phase in active primigravida mothers through Al Qur'an murrotal method

Retno Hastri Risqi Romdhani, Titik Suhartini

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Overview of transfusion reactions in patients with incompatible crossmatch at Sanglah General Hospital, Denpasar, Bali, Indonesia

Betti Bettavia Hartama Pardosi, Ni Kadek Mulyantari, Ida Ayu Putri Wirawati, Anak Agung Wiradewi Lestari, Ni Nyoman Mahartini

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Hematological profile of children under five years with typhoid fever at Idama Banjarbaru Hospital, Indonesia

Harapan Parlindungan Ringoringo, Jun Rahmawati Surya Mentari, Roselina Panghiyangan, E Hartoyo, Rahmiati Lao

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The effect of fear of falling towards falls incidence among knee osteoarthritis patients in Malang, Indonesia: a cross-sectional study

Rakhmad Rosadi, Sri Sunaringsih Ika Wardojo

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Chronic rhinosinusitis patient with nasal polyps at Dr. Soetomo General Academic Hospital Center

Mohammad Lukmanul Hakim, Inwan Kristyono

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Design electronic medical records with clinical decision support system (CDSS) to prevent interaction of drug content in outpatient department

Feby Erawantini, Sustin Farlinda, Arinda Lironika Suryana

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Recording and reporting information system model integrated from midwife practices to public health center

Nur Masruroh, Abdul Hakim Zakkuy Fasya, Dwi Handayani, Andreas Putro Ragil Santoso

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Correlation between Polymorphisms Interleukin-1 Receptor Antagonist (IL-1RA) And Melasma Severity: A Study of Javanese Female Population in Yogyakarta

Betty Ekawati Suryaningsih, Ahmad Hamim Sadewa, Yohanes Widodo Wirohadidjojo, Hardyanto Soebono

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The effect of kefir polysaccharide extract on the expression of matrix metalloproteinase 9 (MMP-9) and integrin activation of HeLa cervical carcinon culture cell

Yahya Inwanto, Eddy Mustofa, Teguh Wiyono, Dodi Tri Oktafianto, Arif Rahman Nurdianto, Rol Rinaldi Widodo

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Efforts to increase interest in using company guaranteed patients by approaching customer relations management

Akas Yekti Pulih Asih, Budhi Setianto, Agus Aan Adriansyah, Difran Nobel Bistara, Nikmatu Sa'adah

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The effect of ginger compress on reducing back pain on the third trimester pregnant women

Siska Nurul Abidah, Fritria Dwi Anggraini

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Long term functional outcome of unipolar and bipolar hemiarthroplasty in femur neck fracture among the elderly at Wahidin Sudirohusodo Hospital, Makassar, Indonesia

Muhammad Sakti, Muhammad Ruksal Saleh, Karya Triko Biakto, Reza Romadhona Fahlevi

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Psychological and coping strategies of the red zone community: a cross-sectional study of COVID-19 pandemic in rural area in Indonesia

Nurul Laili, Mariani Mariani, Titik Suhartini, Erna Handayani

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A bibliometric analysis of coronavirus disease (COVID-19) mortality rate

Husnul Khuluq, Prasandhya Astagiri Yusuf, Dyah Aryani Perwitasari

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The correlation between cotinine levels in active smokers with color blindness

Riski Prihatningtias, Maharani, Meita Hendrianingtyas, Rahma Athifah Amelia, Edward Kurnia Setiawan Limijadi

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Endorphin massage decreases cortisol during menstruation

Yurike Septianingrum, Nety Mawarda Hatmanti, Andikawati Fitriarsari, Nur Ainayah, Difran Nobel Bistara, Erika Martining Wardani

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Quran recitation as noise-induced aggression and resilience in animal model depression

Hafid Algristian, Tri Wahyu Bintari, Iradatus Solihah, Andik Ferdiantoro, Fatmanagri Napstyaw Retno Handajani

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Association of neutrophil-lymphocyte ratio (NLR) with the anthracycline-based neoadjuvant chemotherapy (NAC) clinical response in locally advanced breast cancer (LABC) in young women

Vania Idelia Winantyo, Vidi Vianney Chrisana Magrit Tanggo, Iskandar Ali

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Nurses' perception of their readiness using technology information to face Omicron according to the technology acceptance model

Isak Jurun Hans Tukayo, Paul Sirait, Syaifoel Hardy

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The effectiveness of using peek acuity in vision screening for the admission of elementary school students

Christina Aritonang, Salsabila Auliya Putri, Budi Utomo

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Correlation between clinicopathological factors and clinical outcomes of recurrent epithelial ovarian cancer at a tertiary hospital in Surabaya, Indonesia

Adityo Prabowo, Brahmana Askandar Tjokroprawiro, Budi Utomo

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Nurse students' satisfaction towards blended learning program

I Gusti Ngurah Ketut Sukadarma, I Wayan Suastra, I Gusti Ngurah Pujawan, Putu Kerti Nitiasih, I Gede Yoga Permana

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Implications of VP-Shunt, Sodium Level, Glucose Level Ratio and Neurologic Deficit as Clinical Outcome Prognostic Factor in Adult Meningitis Tuberculosis with Acute Hydrocephalus in Dr. Hasan Sadikin General Hospital

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Ivanmorl Ruspanah, Yulius Hermanto, Yuniasih MJ Taihuttu, Andrew Ruspanah, Achmad Adar Akhmad Imron

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The relationship sarcopenia, obesity with Lung function in the elderly group in Tabanan City, Bali

Wira Gotera, I Made Pande Dwipayana, Ketut Suastika, Anak Agung Gede Budhiarta, Made Ratna Saraswati, I Made Siswadi Semadi, Ida Bagus Aditya Nugraha

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Exploring academic procrastination among nursing students during pandemi COVID-19

Syiddatul Budury, Arif Helmi Setiawan, Nur Masruroh, Francis Don L Nero

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Nutraceuticals of nano-betel (Piper betle L.) leaves: prevent COVID-19 and oral cavity disease

I Gusti Ayu Ari Agung, Sri Wahjuni, Dewa Made Wedagama, I Wayan Weta, Anak Agung Wiradewi Lestari

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Cervical invasion and lymphovascular space invasion as the most associated risk factors for lymph node metastases in endometrial cancer

Devita Kurniawati, Brahmana Askandar Tjokropawiro, Primandono Perbowo

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Analysis of factors that affect the ability in the initial treatment of injured patients with the approach of the airway, breathing, circulation, disability, exposure to the community

Priyo Mukti Pribadi Winoto

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Comparison of the effectiveness between single and repeated administration topical Tretinoin 0.05% on full-thickness acute wound healing

Abraham Surjantoro, Lobredia Zarasade, Lynda Hariani

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LBW incidence based on socio-economic, Hb level and compliance of pregnant women taking Fe supplements

Dahlia Indah Amareta, Cindy Nur Palestin, Alinea Dwi Lestari

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Do social and environmental factors affect level of stress during COVID-19 among nursing students? Results from single center cross-sectional study in Malaysia

Siti Fatimah Sa'at , Annabelle Dimple Kharisha Gill , Bernard Jordan Damianus , Jeremy Dom Saibun, Gill Lerrkey Ukim , Zulkhairul Naim bin Sidek Ahmad

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Early external neurolysis surgery reduces the pain and improves the functional outcomes and quality of life among traumatic brachial plexus injury patients

Azmi Farhadi, Lydia Arfianti, Heri Suroto

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The protective effect of intermittent fasting and physical exercise on obesity through changes in muscle diameter

Aisyah, Hotimah Masdan Salim

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The effectiveness of family empowerment model on early detection ability of risk pregnancy during the COVID-19 pandemic

Ika Mardiyanti, Nursalam, Ernawati Ernawati, Shrimarti Rukmini Devy, Yasi Anggasari

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The Differential Effectiveness of Calcium Hydroxide (Ca(OH)₂) Combination with Chlorhexidine Digluconate (CHX) 2% and Clindamycin Hydrochloride 5% Against Enterococcus faecalis (in vitro)

Erma Sofiani, Novita Kartika Sari

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How face mask usage duration and type affect tear break-up time (TBUT): A survey of health professionals at Sanglah Hospital Denpasar

Andy William, Wayan Eka Sutawan, I Gusti Ayu Made Juliari, I Gde Raka Widiana, Ni Kompyang Rahayu, I Made Agus Kusumadjaja

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Successful rate of glaucoma surgery in uveitis glaucoma

Elsa Gustianty, Novaqua Yandi, R. Maula Rifada, Andika Prahasta

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Stress associated with hypertension in middle-age and elderly in Binong, Tangerang

Martina Pakpahan, Ni Gusti Ayu Eka, Maria Veronika Ayu Florensa

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Characteristics of patients with acute lymphoblastic leukemia in 2016-2020 at Sanglah General Hospital, Bali

Evelin Vianetha Prima Snak, Ni Nyoman Mahartini, Sianny Herawati, Ni Kadek Mulyantari, An Agung Wiradewi Lestari

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Lived experience of nurses at two covid-19 designated hospitals: a phenomenological study

Lina Berliana Togatorop, Ni Gusti Ayu Eka, Ester Silitonga, Alberta Adina Ndruru

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Analysis between cognitive impairment with the level of disability post-stroke patients: A cross-sectional study

Siti Nur Hasina, Nur Ainiyah, Anggy Dyayu Nur Wardhini, Lono Wijayanti

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Factors associated with lymph node metastasis in endometrial cancer

Teuku Mirza Iskandar, Very Great Eka Putra, Ediwibowo Ambari, Endy Cahyono, Lubena

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Relationship between demographics and patient infographics of company guarantees on utilization of inpatient services

Budhi Setianto, Akas Yekti Pulih Asih, Agus Aan Adriansyah, Difran Nobel Bistara, Eppy Setiyowati, Nikmatus Sa'adah

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Nursing care and the psychology effects on post-care nurses serving COVID-19 patients in Vera Cruz isolation room, Dili, Timor-Leste

Domingos Soares, Nursalam, Joaquim Gregorio de Carvalho, Maximiano Oqui, Ivonia Barros, Valente da Silva

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Effect of occupational aluminum exposure on cognitive function among informal aluminum foundry industry workers

Nelmi Silvia, Adi Heru Sutomo, Indwiani Astuti

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Factors associated with the length of hospital stay post an open appendectomy

Muhammad Sayuti, Anna Millizia, Muthmainnah, Muhammad Syahriza

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Incident analysis of patient safety in hospital: Based on feedback and supervision concept

Agus Aan Adriansyah, Budhi Setianto, Nikmatus Sa'adah, Indah Lestari, Pinky Ayu Marsela Arindis, Wahyu Eka Kurniawan

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Prevalence factors and strategies for handling health workers' anxiety in providing health services for COVID-19 variants

Firdaus, Siti Nur Hasina, Budhi Setianto

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The effectiveness of intravaginal fractionated CO2 laser therapy on premenopausal patients with stress urinary incontinence and urge incontinence

Indra Adi Susianto, Perigrinus Hermin Sebong, Aprilia Karen Mendagai

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Contributing factors to musculoskeletal disorders in women who routinely use high heels

O.K Ilham Abdullay Irsyam, Aga Shahri Putera Ketaren, Reza Mahruzza Putra, Steven Tendean, Andrew Budiarta Budisantoso

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Pregnancy care and the relationship between psychological factors and self-care for pregnant women during the COVID-19 pandemic

Yasi Anggasari, Uliyatul Laili, Nur Masruroh

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Level of student education and knowledge about sinovac vaccine with immunization participation

Erika Martining Wardani, Riezky Faisal Nugroho, Difran Nobel Bistara, Andikawati Fitriasisari, Lono Wijayanti, Nur Ainiyah, Yurike Septianingrum

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Clinical characteristics of confirmed patients with COVID-19: A perspective from a tropical region

Difran Nobel Bistara, Nur Ainiyah, Farida Umamah, Yurike Septianingrum, Andikawati Fitriasisari, Lono Wijayanti, Erika Martining Wardani, Susanti, Domingas Da Silva S. Pereira

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Comparison of acute appendicitis severity in pandemic and non-pandemic periods of COVID-19: a comparative study

Achmad Musa, Marjono Dwi Wibowo, Denny Septarendra

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Beliefs and acceptance of covid-19 vaccination among nursing students: a cross-sectional study

Rizka Yunita, Shinta Wahyusari

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Correlation between hemolysis index and storage period to potassium levels of Packed Red Cell in Sanglah General Hospital, Bali, Indonesia

Clareza Arief Wardhana, Anak Agung Wiradewi Lestari, I Nyoman Wande, Sianny Herawati, Ni Nyoman Mahartini

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Risk-taking behavior and biopsychosocial theory for predicting risky sexual behavior of adolescents in Islamic Boarding Schools

Sri Astutik Andayani, Margarita Maria Maramis, Sulistiawati, Reny I'tishom

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Expression of Matrix Metalloproteinase-8 (MMP-8) and Tissue Inhibitors of Metalloproteinase-1 (TIMP-1) after cryotherapy in Aspergillus flavus keratitis at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

Awina Rayungsista, Gatut Suhendro, Dyah Fauziah, Hari Basuki Notobroto, Ismi Zuhria

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TB community empowerment model instruments in finding tuberculosis (TB) suspects

Ro'isah Ro'isah, Anies, Matius Sakundano, Nur Jazuli

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Analysis of mental workload and work family conflict with burnout on lecturers who work from home during pandemic

Andikawati Fitriasari, Yurike Septianingrum, Nunik Purwanti, Nur Ainayah, Erika Martining Wardani, Difran Nobel Bistara

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Risk factor associated with depressive symptoms among adolescence during COVID-19 pandemic in Denpasar Bali, Indonesia

I Gusti Ngurah Sanjaya Putra, Jessica Sugiharto, I Gusti Ayu Trisna Windiani, I Gusti Agung Ngurah Sugitha Adnyana, Soetjningsih, Ni Luh Sukma Pratiwi

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The role of transdermal carbon dioxide on changes in malondialdehyde levels as a marker of ischemia-reperfusion injury in patients with placenta accreta spectrum underwent temporary abdominal aortic cross-clamping as an adjunct procedure during cesarean hysterectomy

Hari Daswin Pagehgiri, Ito Puruhito, Aditiawarman, Pudji Lestari, Yan Efrata Sembiring, Dhihintia Jiwangga, Arief Rakhman Hakim, Rozi Aditya Aryananda

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The Immediate Effects of Porang-Processed Rice (Amorphophallus oncophyllus) on Blood Glucose Levels in Patients with Type 2 Diabetes Mellit

Gabriella Olivia Liawidjaya, Taufik Eko Nugroho, Sulistiyati Bayu Utami, Setyo Gundi Pramud Satrio Adi Wicaksono

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Trends of ischemic stroke admission during two years of COVID-19 pandemic: A retrospective cross-sectional study at a tertiary hospital in Indonesia

Pipit Mei Sari, Atika Mira Agniana, Mohammad Saiful Ardhi

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Development of a tinnitus sound generator that matches the sound of tinnitus patient

Made Lely Rahayu, Gde Ngurah Indraguna Pinatih, Eka Putra Setiawan, I Wayan Lolik Lesma Ketut Tadeus Max Nurcahya Pinatih, I Made Nudi Arthana, I Gusti Ayu Putu Wahyu Widiartari

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The village fund utilization and its implication for public health improvement in the pandemic era

Dwi Handayani, Nurul Jannatul Firdausi

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ORIGINAL ARTICLE

Whitening Effect of Manalagi Apple (*Malus sylvestris*) Extract on Tea-Induced Tooth Discoloration

Nadia Hardini, Rahmania Alikhlash, Dwi Retnoningrum, Edward Kurnia Setiawan Limijadi

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The relationship of religiosity and social support with students adaptation in the islamic boarding school

Khamida, Ah Yusuf, Syiddatul Budury, Anindya Puteri Kareina

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The effect of knowledge and attitude of family planning acceptances on iud contraception selection during the COVID-19 pandemic

Yati Isnaini Safitri, Nur Zuwariah

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ORIGINAL ARTICLE

Combination of thyroid ultrasound examination (TIRADS) and survivin gene mRNA expression to determine the type of thyroid nodule

Fauzy Ma'ruf, Made Agus Suanjaya, Bachtiar Murtala, Muhammad Ilyas, Mochammad Hatta, Rahmad Mulyadi, Rosdiana Natzir, Irfan Idris, M. Husni Cangara, Mirna Muis, Andi Alfian Zainuddin, Dewi Anjarwati, Wiwik Suri Aprianturi

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ORIGINAL ARTICLE

A comparison of functional knee outcomes post-arthroscopic anterior cruciat ligament (ACL) reconstruction using hamstring and peroneus longus (PL) autograft

Muhammad Sakti, Jainal Arifin, Gerald Wonggokusuma, Ferdinand Arden, Muhammad Faidzi

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ORIGINAL ARTICLE

The potential of carrot extract as a sunscreen to prevent apoptosis in white mice (*Mus musculus*) fibroblast cell cultures exposed to UVB light

Bagus Komang Satriyasa, I Gusti Ayu Widiarti, I.B.G. Fajar Manuaba

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Dermoscopic imaging of melasma on various skin colors

Riefka Ananda Zulfa, Imam Budi Putra, Nelva Karmila Jusuf

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Faculty members' readiness for interprofessional education

Ni Gusti Ayu Eka, Marisa Junianti Manik, Grace Solely Houghty, Vivien Puspitasari, Mona Marlina, Neneng Suryadinata

ORIGINAL ARTICLE

Omega-3 effectiveness against viability extended random skin flap in rats

Rifqi Kurniawan, Sitti Rizaliyana, Beta Subakti Nata'atmadja

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ORIGINAL ARTICLE

Phytochemical screening and toxicological evaluation using Brine Shrimp Lethality Tes (BSLT) of ethanolic extract of *Morinda citrifolia* L.

Devyana Dyah Wulandari, Reine Risa Risthanti, Elviana Adhaini Puspita Sari, Hikmatun Anisa, Sisca Filla

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ORIGINAL ARTICLE

Anticipating suicide act of patient with borderline personality disorder and history of severe depression

Ferren Oktavena Faisal, Hafida Algristian, Nur Azizah

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The association between oral antibiotics with the decreased severity index of acne vulgaris in the medical cosmetics division dermatovenereology outpatient clinic of Dr. Soetomo General Teaching Hospital Surabaya from 2017- 2019

Farah Meriana Fajrin, Citra Dwi Harningtyas, Rahmadewi, Afif Nurul Hidayati, Sawitri, Diah Mira Indramaya, Rebekah Juniati Setiabudi, Muhammad Yulianto Listiawan

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Synovial fluid evaluation in COVID-19 patients

Jainal Arifin, Jainal Arifin, Muhammad Nasrum Massi, Yosua Adi Nugroho, Mirza Ariandi, Yosia Handoko

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REVIEW

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A patient with CD4+ T cells deficiency and HIV negative with pulmonary tuberculosis, tuberculous pleuritis and meningitis tuberculosis



Anak Agung Fendy Triwicaksana¹, Musofa Rusli^{2,3*}, M. Vitanata Arfijanto^{2,3},
Bramantono^{2,3}, Nasronudin^{2,3}, Usman Hadi^{2,3}

ABSTRACT

Background: CD4+ T cells deficiency generally occurs in human immunodeficiency virus (HIV) patients, leading to some infections such as pulmonary and extrapulmonary tuberculosis. A rare case of decreased CD4+ T cells is idiopathic CD4+ T cell lymphocytopenia, a rare and unexplained immunodeficiency syndrome with no evidence of HIV infection. In this case report, we are reporting a patient with CD4+ T cells deficiency, pulmonary tuberculosis, pleuritis tuberculosis, and meningitis with HIV test negative.

Case Presentation: A 58-year-old male was referred to the Emergency Department of Dr. Soetomo General Hospital with a gradual decrease of consciousness following six days of hospitalization at a private hospital. During hospitalization, one liter of fluid was evacuated from the right lung and analyzed, revealing tuberculosis infection. History of diabetes, hypertension, stroke, hepatitis, and cardiovascular disease was denied. The patient also never had chemotherapy or radiation treatment. Based on history taking, physical examination, and laboratory results, this patient has been diagnosed new case of pulmonary tuberculosis with deficiency CD4+ T cells and altered consciousness et causes meningitis tuberculosis with pleurisy tuberculosis. After 32 days of hospitalization with anti-mycobacterium therapy, the patient was improved and was discharged.

Conclusion: This case highlights the challenges of having the definitive cause of CD4+ T cells deficiency either active tuberculosis infection or idiopathic CD4+ lymphocytopenia. Therefore, serial analyses of CD4+ T cells are advised on the patient during the treatment with anti-tuberculosis drug.

Keywords: CD4+ T cells deficiency, pulmonary tuberculosis, pleurisy tuberculosis, meningitis tuberculosis, ICL.

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INTRODUCTION

The CD4+ T cells have an essential role in the human immune system by providing help to B cells. CD4+ T cells also contribute to the antiviral responses by producing cytokines and enhancing the response of CD8+ T cells.¹ The deficiency of CD4+ T cells in blood, airways, and lymph nodes can occur due to anti-CD4 antibodies.² Human immunodeficiency virus (HIV) infection is the most common cause of CD4+ T cells deficiency by binding to CD4+ T cells molecules on the surface of T helper cells and replicating inside them. Destroying CD4+ T cells cause a decrease in the stable T cell population and leading to risk of infections caused by bacteria, mycobacteria, viruses, fungi, and parasites.³ However, several cases of CD4+

T cells deficiency cannot be identified. Idiopathic CD4+ lymphocytopenia (ICL) is a rare immune defect with an unexplained CD4+ T cells deficit. In addition, individuals suffering from severe opportunistic infections are also associated with low CD4+ T cell counts. If the patient has no evidence of HIV infection, then ICL became an alternative explanation for CD4+ T cells deficiency.⁴

Another disease associated with CD4+ cells deficiency is tuberculosis. Tuberculosis is the most common leading cause of death among people infected with HIV worldwide.⁵ In 2014, 1.2 million people living with HIV were infected with tuberculosis and over 32% died.⁶ Several cases have shown that ICL is also involved in the immune responses to *Mycobacterium tuberculosis* infection.

A study found that among 259 reviewed cases of ICL, 19 patients were infected with *M. tuberculosis*.⁷

M. tuberculosis can infect other organs except lung causing extrapulmonary tuberculosis. Common manifestations of extrapulmonary tuberculosis include pleurisy tuberculosis and meningitis tuberculosis.⁸ Pleurisy tuberculosis is the most common form of extrapulmonary tuberculosis and it is the commonest cause of unilateral pleural effusion in countries with a high tuberculosis burden.⁹ Meningitis tuberculosis is associated with high morbidity and mortality and when meningitis tuberculosis is suspected, treatment should be commenced immediately without waiting for bacteriological proof of diagnosis. The incidence of pleurisy and meningitis

tuberculosis is higher in people living with HIV than in uninfected patients.^{9,10} Here, we report the case of a patient with no history of HIV with a CD4+ T cells reduction with pulmonary and extrapulmonary tuberculosis.

CASE PRESENTATION

A 58-year-old male was referred to the Emergency Department of Dr. Soetomo General Hospital with a gradual decrease of consciousness following six days of hospitalization at a private hospital. At the private hospital, the level of consciousness started to decrease; the patient spoke confusingly, communicated barely, and closed his eyes often. Two weeks before the admission the patient had headaches, nausea, and vomiting that had gradually worsened. The local community health center has prescribed the patient anti-pain and anti-emetic. The patient also had progressive dyspnea, which was not relieved by rest but by sitting and sleeping sideways. The patient was reported to have a dry cough with fever for three weeks and lost eight kilograms in one month. During the hospitalization, approximately one liter of fluid was evacuated from the right lung, and the patient diagnoses with tuberculosis infection. History of diabetes, hypertension, stroke, hepatitis, and cardiovascular disease were denied and no history of prior swelling, bleeding, or transfusion. The patient also never had chemotherapy or radiation treatment.

Physical examination showed a Glasgow Coma Score (GCS) of 11 (E3V2M5); blood pressure 140/90 mmHg with a regular heart rate of 114x/min (strong pulsation); oxygen saturation of 97% while wearing a three liters per minute (lpm) nasal cannula; regular respiratory rate of 25 x/min and axillary temperature of 37.9°C. The patient had a normal body mass index, 20.7 kg/m².

Head and neck examination revealed no anemic conjunctiva, icteric sclera, lymph enlargement, or thyroid gland enlargement. Chest examination revealed symmetrical breath movement without chest wall retraction. Chest percussion revealed dullness and decreasing tactile fremitus in the third half of the right lung. There was decreased vesicular sound in the third half of the right lung. The

Table 1. Laboratory test results of the patient.

Laboratory test	Lab parameter	Result
Blood analysis	Hemoglobin	14.0 g/dL
	Lymphocytes	7960/mm ³
	Platelet	229000 /mm ³
	Albumin	3.86 mm/h
	Blood urea nitrogen	18 mg/dL
	Creatine	0.73 mg/dL
	Sodium	136 mmol/L
	Potassium	3.7 mmol/L
	Chloride	106 mmol/L
	Blood glucose	116 mg/dL
	Lymphocyte	6.9%
	HIV rapid test	Negative
	HBsAg	Negative
	Aspartate transaminase (AST)	22 U/L
	Alanine transaminase (ALT)	21 U/L
	pH	7.48
	pCO ₂	40
	pO ₂	121
HCO ₃	24.8	
BE	3.3	
Urinalysis	Urinalysis	Within normal limit
Pleural fluid analysis	Adenosine deaminase (ADA) test	79IU/L
	Glucose	9 mg/dL
	Mononuclear	79%
	Polymorphonuclear	21%
	Protein	251 mg/dL
	Rivalta	Positive
	Cytology	Negative

bronchovesicular sound was heard in the left parahillar region. Heart, adnominal, and extremities examinations were all within normal limits. Laboratory tests revealed low count of lymphocyte count (Table 1). Adenosine deaminase (ADA) test of pleural fluid was 79IU/L, Rivalta test positive with protein 251 mg/dL (Table 1).

The chest radiograph (CXR) showed homogenous opacity in the right laterobasal hemithorax shadowing the right costophrenic sinus and fibroinfiltrate in the left and right suprahilar (Figures 1A and B). Neurologic diagnosed with suspected cerebrovascular accident (CVA) with differential diagnostics of tuberculous meningitis and bacterial meningitis. However, a head CT scan with contrast revealed no infection process, infarct, bleeding, or mass on brain parenchyma (Figure 1C-F).

Based on history taking, physical examination, and laboratory results, the patient was diagnosed with altered

consciousness due to meningitis tuberculosis with differential diagnosis of bacterial meningitis with suspected new pulmonary tuberculosis and pleurisy tuberculosis. After five days of hospitalization, cerebrospinal fluid was analyzed for Gram stain and the acid-fast stain. Cerebrospinal fluids analysis demonstrated cell counts of 112 cell/mm³, mononuclear 98%, polymorphonuclear 2%, protein 225 mg/dL, glucose 9 mg/dL, cerebrospinal glucose: serum ratio of 0.075, positive result of acid-fast staining and CD4+ T cells counts 154 cells/mm³. The patient was diagnosed with a new case of pulmonary tuberculosis with ICL and altered consciousness due to meningitis tuberculosis and pleurisy tuberculosis.

The patient was administered with anti-mycobacterium therapy for three days with isoniazid, rifampin, ethambutol, and pyrazinamide. After five days of treatment, additional therapy was given in which the patient was treated with dexamethasone

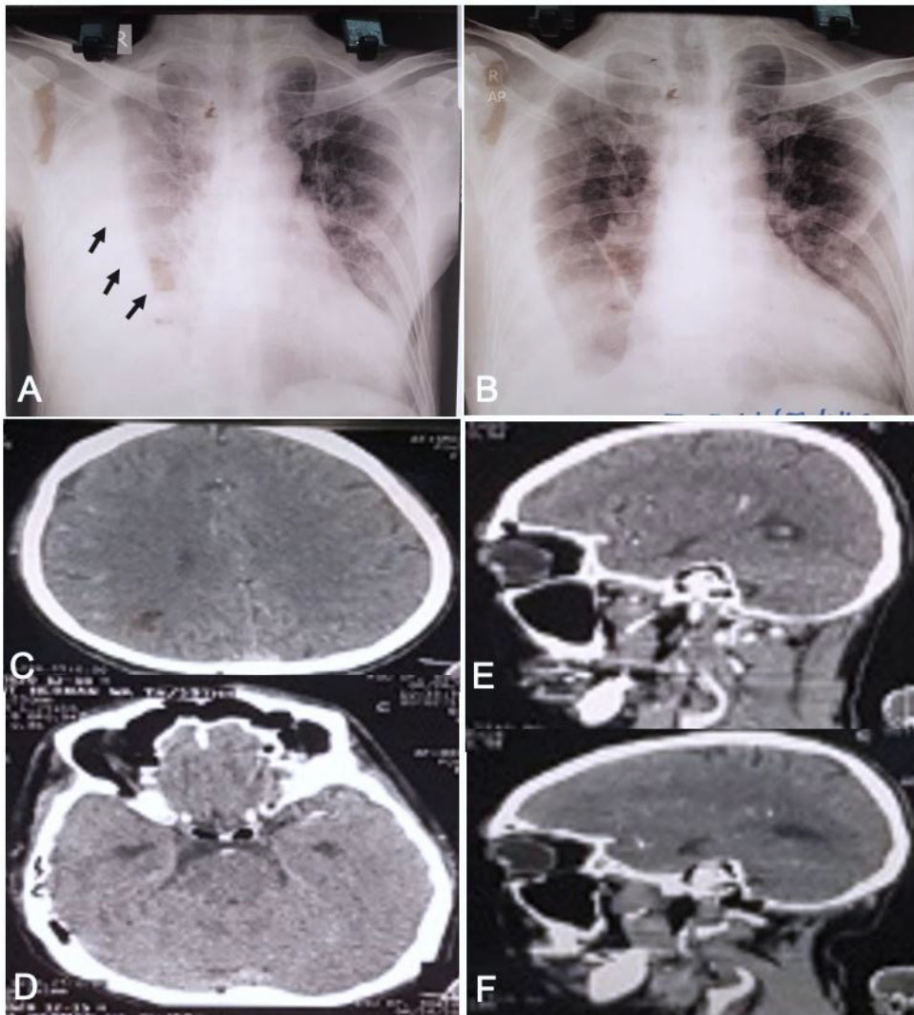


Figure 1. Chest radiograph and head CT-scan of the patient. (A) Chest radiograph showing homogenous opacity in right laterobasal hemithorax prior to fluid evacuation suggesting pleural effusion (black arrows). (B) Chest radiograph showing homogenous opacity in right laterobasal hemithorax shadowing the right costophrenic sinus, fibroinfiltrate in the left and right suprahilar post-evacuation of 1000 ml. (C-F) showing the normal head CT-scan.

and streptomycin until day 11 after which the streptomycin was discontinued. The patient showed improvement after 11 days of treatment with a restored sign of consciousness with GCS of 15 (E4V5M6), orientation to time, place, and person was good, dyspnea had improved, the speech had improved. Day 25 of hospitalization, the swallowing had improved and on day 32, the patient had no complaint and was discharged and was advised to have regular outpatient appointments on Department of Pulmonology, Neurology and Physiotherapy.

DISCUSSION

CD4+ T cell is essential component in white blood cells that plays a central role in activating, coordinating, modulation, and regulating adaptive immune responses.¹¹ The deficiency of CD4+ T cells causes several problems, one of which is an infection caused by pathogens.¹² Several factors causes the deficiency of CD4+ T cells including HIV infection. CD4+ T cells deficiency in HIV patients is common in which HIV is attached to the CD4+ protein on the T cells surfaces and destroys CD4+ T cells, leading to a

weakened immune system.¹³ If CD4+ T cells become depleted to less than 200 cells/UL, the body becomes more susceptible to opportunistic infections, particularly intracellular pathogens such as herpes simplex virus, *Mycobacterium*, *Listeria*, and intracellular fungal infection.¹⁴ Our patient showed a CD4+ T cells deficiency to 154 cells/mm³ and was diagnosed as having tuberculosis and CD4+ T cells deficiency pro evaluation with negative HIV test. This confirms that decreased CD4+ T cells are not associated with HIV.

Other factors contributing to the decline of CD4+ T cells are active tuberculosis and ICL.¹⁵ The possibility of CD4+ T cell deficiency in tuberculosis may be caused by excessive and persistent stimulation during active tuberculosis infection. During developing immunity to *M tuberculosis* infection, CD4+ T cells act as antibodies to send signals to other effector cells. However, *M tuberculosis* dissemination causes CD4+ T cells to overuse functionally and inhibits the proliferation of CD4+ T cells.¹⁶

The CD4+ T cells deficiency in ICL patients is a rare case and ICL is a rare disease. Clinically, ICL manifests from asymptotically to the possibility of severe infections such as caused by *Candida*, cytomegalovirus, and *M. tuberculosis*. Some researchers hypothesize that apoptosis is the cause of CD4+ T cells deficiency ICL patients by T cell receptor cross-linking.¹⁷ The most common infection in ICL patients is caused by *Cryptococcus neoformans* followed by *M. tuberculosis*.¹⁸ In the present case report, the patient was positive for *M. tuberculosis* that infected multiple organs causing pulmonary tuberculosis, meningitis tuberculosis, and pleurisy tuberculosis. Pulmonary tuberculosis is the infectious and the most common form of tuberculosis, occurring in over 80% of cases.¹⁹ A study found that patients who had recently been infected with *M tuberculosis* caused functional fatigue and reduced CD4+ T cells. This correlation between *M. tuberculosis* infection and CD4+ T cells which underlies that tuberculosis treatment will correlate with an increase in CD4+ T cells counts.²⁰ Meningitis tuberculosis also could cause

a decreased in CD4+ T cell levels.¹⁰ The patient with pleural tuberculosis with CD4+ T cells deficiency with HIV was never reported. Pleural tuberculosis generally occurs at a young age with acute or subacute syndromes. Diagnosis of this disease uses pleural fluid biomarkers such as adenosine deaminase (ADA). Patients with ADA values >70 U/L are positive for pleural tuberculosis.^{21,22}

Treatment of CD4+ T cells deficiency can be done by treating the infectious pathogens. In our case, the patient began to improve when anti-tuberculosis drugs were provided clinically. On day 32 of anti-tuberculosis treatment, the patient had no complaints and was advised to discharge. Anti-tuberculosis provided was isoniazid, rifampicin, and pyrazinamide. Since this anti-tuberculosis could cause the hepatitis, monitoring the side effects during treatment is essential and ethambutol is the only safe drug for people with liver disease.^{23,24} Besides side effect monitoring, the risk drug interaction between anti-tuberculosis drugs and other drugs must be evaluated.

CONCLUSION

We reported a case of a fifty-eight-year-old male suspected of CD4+ T cells deficiency with pulmonary and extra pulmonary tuberculosis (meningeal and pleural). The suspected etiology of CD4+ T cells deficiency, in this case, was either active tuberculosis infection or idiopathic CD4+ T cells lymphocytopenia. Therefore, CD4+ T cells recount was advised after tuberculosis treatment to ensure the patient's causative of CD4+ T cells deficiency. This patient highlights the difficulty of have definitive cause of the CD4+ T cells deficiency.

PATIENT CONSENT

The patient's written informed consent was obtained to publish the case in an academic journal.

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DISCLOSURE OF CONFLICTS OF INTEREST

All authors declare that there is no conflict of interest.

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AUTHOR CONTRIBUTION

All authors contributed equally to the study.

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