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REVIEW

Pumpkin Seed Oil: Extraction, Physico-chemical Properties, Biological Activities, and Its Authentication Analysis

IRNAWATI, ANJAR WINDARSIH, SUGENG RIYANTO, SUDIBYO MARTONO, ABDUL ROHMAN



Comparison of Vascular plant leaves in the ability to collect Atmospheric heavy metals in urban areas

MUTHIK A.GUDA, JAWAD K. OBAID, KASIM KADHIM ALASEDI, FARIS J. ALDUHAIDAHAWI, MUTHANNA F. ALI



Latest Updates on Materiovigilance Programme of India (MVPI)

VINITHA E, JAWAHAR N, SENTHIL V

Cytokines: The Immune Warriors in Periodontal Health and Disease- An Overview

DR.JAIDEEP MAHENDRA, DR. SHRUTHI CHANDRASEKARAN, DR.LITTLE MAHENDRA



An Epitome Of The Healthcare System In Underdeveloped Countries Concern With Covid-19

, SRUTHI. N, GOWTHAMARAJAN KUPPUSWAMY, VIGNESH. M



Genus of Baccaurea: Extraction Method, Secondary Metabolites and Its Biological Activities

LINA PERMATASARI, SUGENG RIYANTO, ABDUL ROHMAN



Ecopharmacovigilance: A Comparative Regulatory Framework in The Us and Eu

MS.PALLAVI MN, DR.GANESH GNK, MR.VIGNESH M



Metformin and Its Use in Cancer Therapy

MEGHANADH MANYAM, RAKSHITH K, SAHYADRI M, SAMUEL GEORGE P



Functional mechanisms for the development of acute respiratory viral infection

I.N.MEDVEDEV, E.D.BAKULINA, O.G.RYSAKOVA, E.V.GARINA, A.V.DORONTSEV, F.R.SIBGATULINA



Systematic review: the effect of smoking cessation intervention on population with diabetes

KHANSAA ALBAROODI



A Phytopharmacological Review on Syzygium Cerasoideum

SHAIK SADIK, GEETHA.K.M, VASIA, NAGARAJA SREEHARSHA



Effects of regular exercise on functional activity of cardio-vascular system

S.YU. ZAVALISHINA, A.V. ROMANOVA, I. R. POZDNYAKOVA, R.V. KOZJAKOV, V.I. SHARAGIN



Hand Hygiene and Adverse Skin Reactions: COVID-19 Prospect <i>SHAMBADITYA GOSWAMI, KUSHAL NATH MISHRA, NIKITA PAL, KAMAL SAINI, ASHEESH SINGH, M. V. KUMUDHAVALLI, TEJPAL YADAV</i>	✱
Nutraceuticals as supplements in the management of arthritis: A review <i>SANTOSH KUMAR NAYAK, SUSMITA JENA, PRATAP KUMAR SAHU, PRASHANT TIWARI, HARISH CHANDRA CHAUDHURY</i>	✱
Brucella spp. Virulence Factors: Review <i>THUALFAKAR HAYDER HASAN, HUSSEIN ALI KADHUM, KASIM KADHIM ALASEDI</i>	✱
Use of hydroxyurea in pediatrics with sickle cell anemia <i>ELHAM ALSHAMMARI, ANFAL ALSHAMMARI</i>	✱
Health impact of Obesity: An Overview <i>, MOUSOMI ROY, PRITHVIRAJ KARAK</i>	✱
Lymphatic Targeted Drug Delivery Systems And Its Application To HIV Treatment; A Review <i>JUNA BRIGIT CHACKO, G.R.VIJAYA SANKARA</i>	✱
Modern Views On The Etiopathogenesis And Diagnosis Of Burn Sepsis (Literature Review) <i>, RAKHMATILLO F.AKHMEDOV</i>	✱
An Overview of Coronavirus Disease (MERS& SARS): COVID- 19 <i>, SHAKIR BASHA S, SUSMITHA K, JAGADEESH P, SUSMEENA TABASSUM K, JUNAID A.H, FAYAZ AHMMED S, ZUBER R, KHIFAYATHULLA S, ASWINI G</i>	✱
Comparative assessment of nasotracheobronchial drainage and conservative bronchoscopic debridement in the treatment of patients with lung abscesses complicated by bronchial fistula <i>BAKODIR B.SAFOYEV, AZIZ Q.KHASANOV, NODIR R.KARSHIYEV</i>	✱
An updated review based on literature -Traditional use, Phyto- chemistry and Pharmacology of Leea indica (Burm.f.) Merr <i>LINGARKARSILPAVATHI, MUKESH KUMAR DAS, SOVAN PATTNAIK, DEBAJYOTI DAS</i>	✱
Do generic medicines compromise quality? <i>NADA ALSALEH, ALAA ALSHARIF, ELHAM ALSHAMMARI</i>	✱
Depression And Anxiety In Cardiovascular Diseases: Emerging Role Of Psychotherapy <i>, RAJA D, ELMUTAZ BELAH MOHAMMED, MANJU ROSY JOSE, LIZ MATHEW, JAYAKUMAR C, ANAND VIJAYAKUMAR P R</i>	✱
A Review on Dementia with Lewy Body (DLB) <i>, P.R. ANAND VIJAYA KUMAR, VIGNESHWAR SUNDARARAJAN, VISHAL CHILKURI.</i>	✱
A Review On Nanoparticles: Preparation And Their Applications In Pharmacy <i>SAHIL HUSAIN SIDDIQUI, DR.SUSHMA VERMA</i>	
Flaxseed as A Choice in The Treatment of Non-Alcoholic Steatohepatitis – A Review <i>MAITHRI SHANBHOGUE H, PREETHI S, AMIT B PATIL</i>	✱

Assessment of incidence of post-operative infection among trauma patients with tooth in the line of fracture.	✱
JAYA KEERTHANA S, SENTHIL MURUGAN P, MARAGATHAVALLI.G	
Assessment of prevalence and gender distribution of spacing - a retrospective study	✱
ASHIK AHAMED A, NIVETHIGAA B, RAKSHAGAN V	
Preference of different types of astringents used during impression making in fixed dental prosthesis - a retrospective study	✱
DR.NEPPALA GOWTHAM, DR.NABEEL AHMED	
Incidence of maxillary impacted teeth among patients who underwent surgical removal of impacted tooth an institutional based retrospective study	
SOYA ALFRED XAVIER, DR.ABDUL WAHAB, DR.M.SIVAKUMAR	
Alveoloplasty and oral rehabilitation - an institution based retrospective study	✱
ROGHITH KANNAN, MADHULAXMI MARIMUTHU, REVATHI DURAISAMY	
Assessment of tooth mobility in systemically healthy patients with chronic periodontitis - an institutional based retrospective study	✱
RINIESHAH NAIR R. BASKRAN, BALAJI GANESH S	
Assessment of oral hygiene among outpatients in a dental college- a retrospective analysis	
JAYA KEERTHANA S, L.LEELAVATHI, MARAGATHAVALLI.G	
Association Between Temporomandibular Joint Pain And Periodontitis In Patients With Temporomandibular Joint Disorders Visiting A Private Dental Institution- A Retrospective Study	✱
MUKUNDH CHAITHANYA.V, MANJARI CHAUDHARY, UMA MAHESWARI.T.N	
Analysis Of Temporisation Procedures In Single Crown Fabrication - A Retrospective Study	
RUSHABH KAMDAR, NIVEDHITHA M.S, ARUN MURUGAIYAN	
Microbial Degradation Of Plastic - A Review	✱
BATHALA ANANYA, R.V GEETHA, LAKSHMINARAYANAN ARIVARASU	
Awareness On Biowarfare Among General Public - A Survey	✱
AMIRTHA VARSHINI, R.V. GEETHA, LAKSHMINARAYANAN ARIVARASU	
Has Lockdown Led To The Restoration Of Nature - A Review	✱
JAI REXLIN.P.E, A.K.ANJALI, ANITHA ROY	
Knowledge And Awareness About Synthetic Dietary Supplements Among Public - Survey	✱
C.PRATHIBA REICHAL, R.V GEETHA, LAKSHMINARAYANAN ARIVARASU	
Association Between Stress And Monosodium Glutamate On Consumption Of Fast Foods Among South Indian Population-A Survey	
S.RAGUL PRASATH, KARTHIK GANESH MOHANRAJ, JOTHI PRIYA. A	
The Impact Of Dentistry On Recent Advances In The Management Of Hypertension-A Review	✱
E.THARINY, MP BRUNDHA	

Effects Of Kabasura Water Against N-Cov - A Review

S.KAMALA DEVI, SMILINE GIRIJA A.S



Preventive Measures To Stop N-Cov Transmission - A Review

S.BALAMITHRA, SMILINE GIRIJA AS



Bioactive Roles Of Ginger And Its Effects Against Food Borne Pathogens - A Review

NANCY SELVAMARY.V, SMILINE GIRIJA.AS

Dentin Desensitising Agents

ASHWINI.K, VINAY SIVASWAMY



New Concepts Of Antigenic Shift And Antigenic Drift In Influenza And Corona - A Review Of Literature

V.M.KAYAL, DR. M.P BRUNDHA, DR.VINAY SIVASWAMY



Diagnostic Algorithm Of Covid 19 Screening And Testing - A Review.

S.PADMAJA, DR.M.PBRUNDHA



Crown Removal Methods In Dentistry - A Literature Review

P.A.VASISHTA, VINAY SIVASWAMY



Role Of Government During A Quarantine - A Review

AATHIRA.C.M, LAKSHMINARAYANAN ARIVARASU



Luting Agents In Dentistry- A Review

THEIVA CHANDRAN.R, JAYALAKSHMI SOMASUNDARAM, ANJANEYULU. K

Indian Spices And Immunity —A Review

V.SRI SRESHTAA, JAYALAKSHMI SOMASUNDARAM, ANJANEYULU K



Antibiotic Use And Antimicrobial Resistance - A Review

P.G.SUSHMA, DR.VENKATESH, DR.L. KEERTHI SASANKA, S.KAVITHA



Moringa oleifera as a Herbal Treatment for Oral Cancer : A Systematic Review

HARUN ACHMAD, ARNI IRAWATY DJAIS, YUNITA FEBY RAMADHANY, ELENA G. PETRENKO, ALEXANDER MARKOV, BAYU INDRA SUKMANA



Biosynthesis of Silver Nanoparticles to Design the Bio-Composite Films: A Review

MUHAMMAD LUTHFAN, EDY SUBROTO



Role of Oxidative Stress in pathophysiology of Cardiovascular Diseases: A Comprehensive Review

, NIRAJ KUMAR SINGH, YASH KUMAR SINGH



Ras Ratna Pradip- A Book Review

DR SANKALP SHARMA, DR AMIT UPASANI, DR KRISHNA RATHOD, DR V.M SREEKANTH

Cytokine Storm: A Substantial Peril to Human Health











JEETENDRA KUMAR GUPTA



Proteus Mirabilis Virulence Factors: Review

THUALFAKAR HAYDER HASAN, KASIM KADHIM ALASEDI, AHMED ABDULJABBAR JALOUB ALJANABY



The Using of Ethanol and Isopropyl Alcohol as a disinfectant: Review <i>, THUALFAKAR HAYDER HASAN, HUSSEIN ALI KADHUM, KASIM KADHIM ALASEDI</i>	
Gender Features of Neurological Manifestations in Ischemic Stroke <i>ASADULLAYEV MAKSUD MAKHMUDOVICH, RAKHIMBAEVA GULNARA SATTAROVNA, VAKHABOVA NARGIZA MAKSUDOVNA, ASADULLAYEV HAMIDHON MAKSUDOVICH, MIRZAAKHMEDOV FARRUKH MIRADILOVICH, SAIDNOSIROV OYBEK QOBILOVICH</i>	
Ozone therapy- an emerging boon in periodontal management <i>DR. JANANI M, DR. JAIDEEP MAHENDRA</i>	
A Review on Selected Herbs as Skin Care Cosmetics <i>JOTHI PRAKASH. K, DR.JAWAHAR.N, DR.SENTHIL.V, HARIHARAN.R</i>	
Mental Health Disorders in Marital Relationship: A Review of Sudha Murty's Fictional Characters <i>PREMA S, DR. ARUNA ARPUTHAMALAR</i>	
Niosomes: A Targeted Drug Delivery System Overview <i>SHUMAILA KHAN, DR. SUSHMA VERMA</i>	
Review on Ionic Liquids: Green Solvent for Extraction of Herbal Active Ingredients from Medicinal and Aromatic Plants <i>SANDEEP B. MUNDHE, SUYOGKUMAR V. TARALKAR, PRAKASH G. JADHAV, SANJAY B. DETHE</i>	
Superbugs in Endodontics <i>M.MANOJ.B.D.S, R.ASHWIN, K.VIJAY VENKATESH, M.D.S</i>	
Evans syndrome after Allogenic Peripheral Hematopoietic Stem Cell transplantation in a child with Severe Acquired Aplastic Anemia: case report and literature review <i>GHOLAMREZA BAHOSH, FATEMEH AFRASHTEH</i>	
An Epitome On Contemporary Transdermal Drug Delivery System [Tdds] Technology <i>KALKI.S , DR.G, N.K GANESH, MANISHA.P</i>	
An Overview on Nasal Drug Delivery System <i>PRAVIN.C , DR.GNK.GANESH, CHOUTHRI.D</i>	
Trefoil Factors and the Periodontium: Unravelling the Secrets <i>DR. SRUTHI SRINIVASAN, DR. JAIDEEP MAHENDRA, DR. K. ANILKUMAR, DR. LITTLE MAHENDRA</i>	
A Review On Herbal Cosmetic Cream For Chickenpox Blisters And Scars <i>MANISHA.P , DR.JAWAHAR .N, DR.SENTHIL .V</i>	
An Overall Review of Quality by Design Approach <i>KALAIVANAN , MITHRA CHANDRASEKARAN, ARUN RADHAKRISHNAN</i>	
Disaster Management- An Comprehensive Review <i>R.V.GEETHA , T LAKSHMI</i>	

Pharmacological studies of *Celastrus paniculatus* -A Review

SHALU ATTAR, RAHUL KUMAR SHARMA



A review of classification algorithms in machine learning for medical IOT

, R. PRABHA, BALAKRISHNAN S, S. DEIVANAYAGI, V.K.G. KALAISELVI, D. PUSHGARA RANI, ASWIN G



Pharmaceutical applications of genus *sargassum* in algae: a review

MANJUNATH K, K MRUTHUNJAYA, HARIPRIYA G



Overview of Adherence and Influencing Factors to Capecitabine In Cancer Patients: Systematic Review

ATIKA WAHYU PUSPITASARI, SUSI ARI KRISTINA, SATIBI, YAYI SURYO PRABANDARI



Production and Characterization of Isoflavones

RAHILA YAKOOB, B.V.PRADEEP



The efficacy of zinc supplementation in postpartum depression: A review of studies on pregnancy and post-delivery care

ELHAM ALSHAMMARI



An Overview of Cocoa Butter: Novel Excipients for Oral Tablets

PEARLY CHIA ZHI QING, ASHOK KUMAR JANAKIRAMAN, SHIEK ABDUL KADHAR MOHAMED EBRAHIM HABIBUR RAHMAN, LIEW KAI BIN



Factors associated with stroke in Thai young adults: an integrative review

VACHIRA POSAI, WANICH SUKSATAN



A Review: Activity Study of Itchy Leaves (*Laportea decumana* Roxb Wadd) as a Medicinal Plant

LUKMAN LA BASY, HASYRUL HAMZAH, ASRIULLAH JABBAR



"Chrono-therapeutics: Recent advances and development"

S.JAWED , SATISH C.S



A comparison of Natural and Synthetic Sunscreen Agents: A Review

, DEVANJALI BHATTACHARJEE, PREETHI S, AMIT B PATIL , VIKAS JAIN



Trefoil factors and the Periodontium: Unravelling the Secrets

DR. SRUTHI SRINIVASAN, DR.JAIDEEP MAHENDRA, DR.K.ANILKUMAR, DR.LITTLE MAHENDRA

A Review on Prominent Biomaterials Employed in the Management of Diabetic Wounds

SURAJ S, PREETHI S, AMIT B PATIL, VIKAS JAIN

Yogachintamani – A Book Review

PATEL RAJAT, V. M SREEKANTH, UPASANI AMIT, RATHOD KRISHNA

Repurposing of Drugs: Progress, development approaches and challenges

RASANPREET KAUR, AKSHATA MANDLOI, SUDARSHAN SINGH LAKHAWAT, DESH DEEPAK SINGH, SUNIL KUMAR, VIKRAM KUMAR



Extraction Methods of *Amomum compactum*: A Review

TYAGITA HARTADY, ROOSTITA LOBO BALIA, MAS RIZKY ANGGUN ADIPURNA SYAMSUNARNO, SABRI JASNI, BAMBANG PONTJO PRIOSOERYANTO



An Insight of Emerging Role of Nanotechnology for the Management of Athlete's Foot

KARTHICK, AISHWARYA REDDY, RAMAN SURESHKUMAR



Updates on Synthesis and Biological Activities of Quinoline Derivatives: A Review

SHIVALI MISHRA, SALAHUDDIN, RAJNISH KUMAR, AVIJIT MAJUMDER, AJAY KUMAR, CHANCHAL SINGH, DEVLEENA TIGLANI



Analysis of the study of motivational perceptions in patients with diabetes and hypertension for successful self-management

SENTHILKUMAR V, MAHESHKUMAR VP, SENTHILKUMAR SK



Aerosols in Dentistry – Microbes, Disease Transmission and Infection Control: Concepts Revisited

SHONALI VIJAYARAJ, GEETHA ARI, SATHISH RAJENDRAN, JAIDEEP MAHENDRA, LAKSHMI PRIYA.K, AMBALAVANAN NAMASIVAYAM



Critical Review of Nidan, Nidan Parivarjan and its Significance in Treatment

DR.APARNA BAGUL, VD.ARUN VAIDYA, DR.VAIDEHI RAOLE

Risk of Parabens in Human Use

KARTHIKEYAN L V, JERO VICTOR WILSON, SHUBHAM KUMAR PARIDA, BIKASH CHANDRA NATH, DR.M.R.JEYAPRAKASH



Core-Shell Nanoparticles Epigallocatechin-3-Gallate and Chitosan/Hyaluronic-Acid as a Socket Preservation for Dental Implant

MARTINING SHOFFA PUSPITANINGRUM, RIFQAH ANANDA MAPPANANRANG, ALEXANDER PATERA NUGRAHA



Clinical Trial Regulations of Personalized Medicine

TEENA SHERIN M, ARUN RADHAKRISHNAN



A Detailed Review on Drug Delivery Technologies for the Management of Brain Tumour

ARUN K, ARUN RADHAKRISHAN

Judicial Review in Indonesia State Systems

MONICA PUSPA DEWI SUGANDA PUTRI, FX.ADJI SAMEKTO, YUSRIYADI, PARAMITA PRANANINGTYAS

The first psychological management intervention towards community resilience facing covid-19 infection

DIAH PRIYANTINI, NURSALAM NURSALAM, TINTIN SUKARTINI



Behavioral analysis of customer through customer review and profile using chi-square method

, DR.SARVJEET KAUR



Covid-19 vaccine candidates under clinical evaluation - a review

, DINESH KUMAR LAKSHMI NARAYANAN, SAMINATHAN KAYAROHANAM, SHIVKANYA FULORIA, NEERAJ KUMAR FULORIA, ASHOK KUMAR JANAKIRAMAN, SINOUVASSANE DJEARAMANE, YUAN SENG WU, SRIKUMAR CHAKRAVARTHI, VETRISELVAN SUBRAMANIYAN



Synthetic Approaches and Biological Activities of Quinoline Derivatives: A Review

DEVLEENA TIGLANI, SALAHUDDIN SALAHUDDIN, AVIJIT MAZUMDER, RAJNISH KUMAR, SHIVALI MISHRA



Epithelioid Malignant Peripheral Nerve Sheath Tumor of Sciatic Nerve: a Case Presentation and Literature Review

REZA TAVAKOLI DARESTANI, FARZAD AMOUZADEH OMRANI, MOHAMADMAHDI OMIDIAN, HAMED HAKIMI ASIABAR, MOHAMMAD AMIN SHAHRBAF, HASSAN BARATI

Mental Health: The Matter of Serious Concern- A Review

MAHESH SIRASANGI, SEEMA MEHDI, K L KRISHNA, SAHYADRI M, NIRMA



Factors Affecting Chronic Kidney Disease Costs : Systematic Review

ENDANG SUNARIYANTI, TRI MURTI ANDAYANI, DWI ENDARTI, DIAH AYU PUSPANDARI



Ganoderma Lucidum (Curtis) P. Karst.: An Updated Overview

PARAMAKRISHNAN N, HARIPRIYA G, JEEVA GEORGE, POORANI S, PRAVEEN R, RAHUL S, VARSHA P

A Systematic Review on Technical Aspects in the Development of Dry Powder Inhalers (DPI)

PRIYANKA SATISH GONDHALE, DR. BINOY VARGHESE CHERIYAN



The Doomed Journey Of Covid-19 – Diagnosis, Pathological, Genomic And Treatment Profiling

RAMANPREET WALIA, SHIKHA SAXENA, SHRIYANI ROY



Title:Preprosthetic Surgeries and its Protocol for Complete Dentures: A Review

HANAN GHAZI SHANAB, FARHEENA USTAD, GHUFRAN IBRAHIM ABDULRAHMAN ALAYFAN, SHAEESTAKHALEELAHMEDBHAVIKATTI, ABDULRHMANMOHAMMEDYALYOUSEF, ABDULRAHMAN YOUSUF ABDULRAHMAN ALSHEBEL



Revealing the lactogenic, anti-obesity and antidiabetic activity of Cyperus rotundus

SARITHA R, SUSEEM S.R



Neonatal risk factors for cerebral palsy

, B.ABHINANDH, KRIPA LALVI, ROSHNI P R



Phytoextraction Study of Cadmium and Lead Using Different Plants in Polluted Soils: A Review

ALI HUSSEIN HANO, MOHANAD LUAY JAWHER, SHAHLAA HUSSEIN HANO

"Role of dietetics and lifestyle in type 2 diabetes mellitus."

DR.NEHA SHARMA, DR.SHAILESH DESHPANDE



A Review On Therapeutic Potential Of Punica Granatum

ARUN KUMAR, RAKHI MISHRA, VEENA D SINGH, AVIJIT MAZUMDER, RUPA MAZUMDER, AKHALESH KUMAR



A new curcumin analog, CCA-1.1, induces cell cycle arrest and senescence toward ER-positive breast cancer cells

DHANIA NOVITASARI, FEBRI WULANDARI, RIRIS ISTIGHFARI JENIE, ROHMAD YUDI UTOMO, JUN-YA KATO, EDY MEIYANTO



Stability Indicating RP-HPLC Method Development and Validation for the Determination of Ivacaftor in Bulk and its Pharmaceutical Formulation

TANUJA, S. GANAPATY, VARANASI S N MURTHY



COVID-19 Knowledge and Perception Among HealthCare Professionals in Two Arabian Gulf Countries

NADA A. ALSALEH, ELHAM ALSHAMMARI, ALAA ALSHARIF, MESHARI ALHAMED, ABDULMOHSEN ALSALEH, ABEER ALSMARI, ANFAL ALSHAMMARI, AHLAM ALSHAMMARI



Study of BMI, Glucose Level and Lipid Profile in Type 2 Diabetes Mellitus

MOUSOMI ROY, ARINDOM BANERJEE, SATYANARAYANA P. RAJKUMAR MAITI, PRITHVIRAJ KARAK, FATIK BARAN MANDAL



Sensitive and Developed Normal-FIA Methods for The Spectrophotometric Determination of Diosmin In Pharmaceutical Formulations Using Diazotization Coupling Reactions

MAYASA MOHAMMED, SADEEM SUBHI ABED



Formulation Development and Optimization of Extended Release Pellets of Dexketoprofen Trometamol

BHUPENDRA G. PRAJAPATI, ALPESH PATEL



A Cross Sectional Study on Stress Among Medical Students of Kolhapur City of Maharashtra Study on stress among medical students

DR. JEEVANKUMAR U. YADAV, DR. DEEPMALA J. YADAV

Nanocatalytic Efficacy of Silver Nanoparticles Fabricated Using Camellia Sinensis (Linn) Tender Leaf Extract and Their Characterization

KRISHNAKUMAR S, BETHANNEY JANNEY J, SINDU DIVAKARAN, LUMEN CHRISTY V, PRAKASH WILLIAMS G



Calcium Hydroxide Upregulates Interleukin-10 Expression in Time Dependent Exposure and Induces Osteogenic Differentiation of Human Umbilical Cord Mesenchymal Stem Cells

, ERIC PRIYO PRASETYO, MEFINA KUNTJORO, FEBRIASTUTI CAHYANI, SETYABUDI GOENHARTO, WIDYA SARASWATI, DEVI EKA JUNIARTI, NIKE HENDRIJANTINI, NINUK HARIYANI, ALEXANDER PATERA NUGRAHA, FEDIK ABDUL RANTAM



Study of School Entomology Factors on The Impact of Behavioral Changes (Combi) Of the Incidence of Dengue Hemorrhagic Fever in Elementary School Children

ASRIWATI AMIRAH, ISMAIL EFENDY, ARIFAH DEVI FITRIANI, ENDANG



Synthesis and Antibacterial Activity of New Cefotaxime Derivatives

WASFI AL-MASOUDI, RITA S. ADAM, SAMAR S. GHAZI



Authentication Analysis of Snakehead Fish Oil Using Combination of FTIR Spectra and Chemometrics

FELLA SYIFA, IRNAWATI, ALDI BUDI RIYANTA, ABDUL ROHMAN



Awareness of Diabetes Mellitus Among Rural Population in Indonesia <i>SUSI ARI KRISTINA, FARRAS AMSI SALSABILA, SUCI HANIFAH</i>	
Evaluation of Different Prepared Binary Systems for Different Pharmaceutical Applications <i>OMAR Y.MADY, AHMED A.DONIA, ESMAT ZEIN EL-DEEN, SOAAD AHMED</i>	
Anti-Inflammatory And Toxicity Studies Of Substituted Hydrazine Pyrazolone Derivatives <i>SINDHU E, ROOPA P NAYAK, PREMA SALDANHA, DARSHAN RAJ C G, SHASHIDHARA KS</i>	
Qualitative Analysis and In-Vitro Anthelmintic Evaluation of Cleome Gynandra Stem <i>ANANDARAJAGOPAL KALUSALINGAM, NASYIKA SAMSUDIN, ABDULLAH KHAN, KRUPAVARAM BETHALLA, VIJAY KOTRA, KAI BIN LIEW, MEI JUN LOY, SIEW MEI YEE</i>	
Adenine Used as Agent Induced of Chronic Kidney Disease Accompanied Anemia for Rats and rHuEPO-alpha on MgO Nanoparticles as Drug Delivery 'in vivo study' <i>AMEER SULTAN, ASMA HADI MOHAMMED, FATIN FADHEL MOHAMMED AL-KAZAZ, SHAIMAA HAMED JABER</i>	
Social Function of Land and Legal Protection for Communities in Accessing the Right for Road <i>LATANIA TRIRAMDHANI, SIYED ABDUL RAHMAN BIN SIYED OSMAN AL ATTAS</i>	
Recontextualizing The Patriarchal Dominance Of Manggarai Heritage Customary Law System By Democratic And Gendered Orientation <i>ADRIANUS NGGORO, FX. ADJI SAMEKTO, SUKIRNO</i>	
Management of Adverse Effect from Antiretroviral Drugs at HIV/AIDS: Ernaldy Bahar Hospital at South Sumatra Indonesia <i>LILIK WAHIDAH, MASHURI YUSUF AND DIAN ARDIANSYAH</i>	
Functional Features of The Cardiovascular System in Athletes with Minor Heart Anomalies <i>I.N. MEDVEDEV, M.A. CHICHKOVA, M.V.EREMIN, A.A. SVETLICHKINA, A.V. DORONTSEV, N.G. PRYANIKOVA</i>	
Judicial Policy for The Covid-19 Pandemic in Comparative Legal Perspective <i>M.Z.M.NOMANI, ZAFAR HUSSAIN, RENU DHAWAN</i>	
Applications of Micro-Computed Tomography in Dentistry <i>S.ABIRAM PRASAANTH.B.D.S, TRIPURAVARAM VINAY KUMAR REDDY, M.D.S, SURESH MITTHRA, K. VIJAY VENKATESH, M.D.S</i>	
Synthesis of Prodrugs of Metronidazole to Mask the Bitterness <i>OMAR ABDULRAHMAN ALSHEIKHLY, DANA AMEEN</i>	
Prospecting SEHAT-Kader Project to Decrease Perceived Stigma and Improve Quality of Life People Living With HIV/AIDS at Kudus District, Central Java <i>ERNAWATI ERNAWATI, NURSALAM NURSALAM, SHRIMARTI RUKMINI DEVY, SITI AMINAH, AHMAD FATHUROHMAN, TRI HARTITI, ARIEF YANTO, MACHMUDAH MACHMUDAH</i>	

The functional state of the body of older men experiencing regular recreational stress

S.YU.ZAVALISHINA, V.YU.KARPOV, M.V.EREMIN, N.G.PRYANIKOVA, S.YU.TATAROVA



Development Of Immune Structures Of The Leaning Intestine Of Rabbits In Early Postnatal Ontogenesis

FIRDAVS ORIPOV, SOPHIA BLINOVA, TASHPULAT DEKHKANOV, SALIM DAVLATOV



Verification of Radiation Methods in Diagnostics of Injuries of The Knee Joint Intra-Articular Structures

MARAT KHODZHIBEKOV, OBID KHAMIDOV, GULSHAT MARDIEVA



Antioxidant Activity and Acute Toxicity of New N4 -Substituted5-(1,2,4-Triazole-1-Ylmethyl)-1,2,4- Triazole-3-Thiones And S - Derivatives

S.S.ZYKOVA, G.V.TSAPLIN, V.S.TALISMANOV, I.P.BULATOV, S.V.POPKOV, ? G.KARMA



Antimicrobial activity of quercetin from Majapahit (Crescentia cujete L.) fruit extracts: an in silico study

SRI RAHMANINGSIH, HERNIK PUJIASTUTIK

Novel 5-(4-bromophenyl)-1,3-oxazole derivatives: Synthesis, Characterization, Docking and Evaluation of in vitro Anticancer Activity

PRADEEP GOLANI, SUNIL KUMAR SHAH, C.K.TYAGI



Synthesis and structural characterization of ZnTiO₃ nanoparticles via modification sol-gel proses for assessment of their antimicrobial activity

AHMED RHEIMA, NIBRAS ABDUL-AMEER ABOUD, BASMA ESAM JASIM, AHMAD H.ISMAIL, ZAINAB SABRI ABBAS



Efficiency of Ficus carica Latex in therapy of Leishmania tropica In Patients

DR.SHAIMAA A.SHLASH, M.SC.NOOR A.NEAMA, DR.EMAN THABIT NADHAIF ALFATLAWY



A clinical study to evaluate the effect of Ardhamatrik Niruha Basti & Bala Taila Sneha Basti in the management of Vatarakta w.s.r to Gout.

MAITREE PATEL, LAL RAVI SAHU, PARAPPAGOUDRA M, RAVI PANDYA



Efficacy of Tagetes erecta Linn. leaf extract cream on rat dermal wound healing

, MAURITIUS LAMBERTUS EDY PARWANTO, DAVID TJAHYADI, HOSEA JAYA EDY



Impact of non-surgical periodontal therapy on oral health related quality of life

THANISH AHAMED.S, ARVINA RAJASEKAR



Women Decision for the Post COVID 19 Era An Action to call from Delhi-NCR, India

DR.NITIN GIRDHARWAL, DR. MRINAL VERMA



Evaluation of the effect of 1% Metformin Gel coating on the osseointegration achieved around dental implants using bone mineral density and radiofrequency analysis- A clinical and three-dimensional radiographic study.

HIMANI SHARMA, ANAMIKA SHARMA, SWATI GUPTA, APOORVA MOWAR, CHANDAN KUSUM



Biosimulation studies-based optimization of fungal derived Lovastatin

R.S.UPENDRA , SANTHARAM S KATTA



The Effect of Mindfulness-based Eating Exercise with Social Cognitive Theory (SCT) Approach to Self-Efficacy and Dietary Adherence of Diabetes Mellitus Type 2

SYLVI HARMIARDILLAH, KUSNANTO, ILYA KRISNANA, I KETUT ANDIKA PRIASTANA



Production of antimicrobial compound from a novel keratinolytic bacteria *Bacillus tequilensis* MBR 25 for the control of foodborne pathogens

BETHALA RAMYA, PANDU. BRAHMAJI RAO



Multi-Machine Learning Binary Classification, Feature Selection and Comparison Technique for Predicting Death Events Related to Heart Disease

RITU AGGRAWAL, SAURABH PAL



The relation between maxillary buccal canine impaction and dental anomalies - A retrospective study

REEM A.RAFEEQ, SARA M. AL-MASHHADANY, HIBA M. HUSSEIN., RESHA J. AL-SUDANI, MAISAA Q. MUHAMED ALI



Evaluation of mean platelet volume before and after iron deficiency anemia treatment.

SAFA A.FARAJ, ALAA M. AL-RUBAE, AHMED I. ANSAF



Vitamin B12 Deficiency in COVID-19 Recovered Patients: Case Report

ELHAM ALSHAMMARI



Magnesium supplementation for premenstrual syndrome and premenstrual dysphoric disorder.

ELHAM ALSHAMMARI



Management Of Drug Logistics At Pharmacy Installation Dr. Wahidin Sudirohusodo Makassar Hospital

, GEMY NASTITY HANDAYANY, FATHURRAHMI



Immunocorrection of patients with polytrauma depending on the facial region injury.

, IBRAGIMOV DAVRON DASTAMOVICH, BOYMURADOV SHUKHRAT ABDOJALILOVICH, GOFFAROV USMON BOBONAZAROVICH, BOBAMURATOVA DILNOZA TURDIKULOVNA, ISMATOV FARRUKH, ISMATOV NAVRUZ

Biochemical Markers Of Metabolic Disorders In The Blood Of Patients With Jaw Fractures In The Post-Traumatic Period

, BOBAMURATOVA DILNOZA TURDIKULOVNA, BOYMURADOV SHUKHRAT ABDOJALILOVICH, ANSHUL J.RAI, YUSUPOV SHOKHRUKH SHUXRATOVICH, NARMUROTOV BAKHTIYAR QARSHIYEVICH, IBRAGIMOV DAVRON DASTAMOVICH, ABDURAKHMONOV FARKHOD RAKHMONOVICH

Alternative solution for konigsberg bridge problem through the concept of matching

R.SAMPATH , K.SRINIVASAN, P.THARANIYA, P.ELUMALAI



Domination in different graphs

K.MYTHILY , S.KALAIVANI, P.ELUMALAI , P.THARANIYA

Domination in different graphs

K.MYTHILY, S.KALAIVANI, P.ELUMALAI, P.THARANIYA

Forensic medical assessment of injuries in pedestrian children in fatal automobile injury

, INDIAMINOV SAYIT INDIAMINOVICH, SHOYIMOV SHUKRILLO UMURZOKOVICH



The peculiarities of permanent teething in children living in Tashkent city

, ROZA KAMILOVA, JAVLON KAMILOV

Evaluation of Piperine from leaves of Piper longum Linn

, MANISHA MOHAPATRA, UDAY C BASAK

Assessments of HBV in patients with chronic kidney illness

, ALAA HAMZA JABER AL-JELEHAWY, SAIF JABBAR YASIR, AHMED KIFAH ABED AL-WAELI, ALI RADIH ABULAMEER SHER ALI

Socio-economic analysis of broiler livestock business in West Lombok district, Indonesia

MUHAMMAD YASIN,

Inhibitory and eradication activities of 1-monolaurin as anti-biofilm on monospecies and polymicrobial of Staphylococcus epidermidis and Candida tropicalis

, CHAERUL FADLY MOCHTAR, ETI NURWENING SHOLIKHAH, DWI ARIS AGUNG NUGRAHANINGSIH, TITIK NURYASTUTI, FEBRI ODEL NITBANI, JUMINA



Supplementation of Feed Additives on Aquaculture Feeds: A Review

, SANAA ABDULAZIZ MUSTAFA, JAMAL KHALAF AL-FARAGI



Coronavirus disease (covid-19) outbreak in india

, DANIEL FRANCIS SELVARAJ, BALAKRISHNAN S, MANOPPAUL P



Analysis of egg consumption in palu and sigi district communities

KETUT SUARAYASA, JULIUS SUGIHARTO, SAIRAMA SARAGIH, VITA ARISTYANITA, BERTIN AYU WANDIRA



Ultraviolet Spectroscopy Combined With Multivariate Calibration for Analysing Caffeine, Nicotinamide and Pyridoxine In Simulated Energy Drinks

, MICHAEL RAHARJA GANI, FLORENTINUS DIKA OCTA RISWANTO



Online and conventional learning as viewed by students from pharmacy

, ELHAM ALSHAMMARI, EMAN ALOTAIBI



New facile technique for estimation of piroxicam in bulk drug

KAMAL SHAH, GAURAV KRISHNA, JEETENDRA KUMAR GUPTA



Oral Health Condition and Physical Activity of Children in COVID-19 Pandemic

, NANDA RACHMAD PUTRA GOFUR, AISYAH RACHMADANI PUTRI GOFUR, SOESILANINGTYAS, RIZKI NUR RACHMAN PUTRA GOFUR, MEGA KAHDIRA, HERNALIA MARTIDAL PUTRI



Physiological mechanisms for maintaining health in ontogenesis

I.N.MEDVEDEV, D.M.PRAVDOV, O.A.KOZLYATNIKOV, N.M.LAPINA, S.V.PERSHIKOV, V.I.SHARAGIN



Formulation and Evaluation of Fast Disintegrating Tablet of Paclitaxel by Hydrotropy Technique

, SYEDA SHABANA SULTANA, DR.K.APPANNA CHOWDARY, DR.SUMER SINGH



Implementation of code stroke protocol in acute ischemic stroke at a hospital in Aceh, Indonesia

, SYAHRUL SYAHRUL, ENDANG MUTIAWATI, IMRAN IMRAN, SUHERMAN SUHERMAN, NOVA DIAN LESTARI, FARIDA FARIDA, NURUL FAJRI, NURUL HUDA



Non-Tuberculosis Mycobacteria In Phthisio-Pulmonological Practice In The Republic Of Uzbekistan

, NARGIZA PARPIEVA, SANJAR SULTANOV, MUHABBAT DZHURABAEVA, EKATERINA ANVAROVA, BABAMATOVA KHILOLA, MUKHAMEDOV KOZIM



Simple New Colorimetric Method Development for the Estimation of Flupirtine Maleate in Bulk and in Pharmaceutical dosage Form

, P.V.DUSE, K.G.BAHETI

Collaboration Between Interprofessional Healthcare and Patients to Improve Quality of Life Type 2 Diabetes via Smartphone Application

, LUSY NOVIANI, AJENG DIANTINI, ANAS SUBARNAS



The impact of exogenous and endogenous factors on the stomach wall, macro-, microscopic anatomy of newborn white rats

SHUKHRAT J.TESHAYEV, DILSHOD K.KHUDOYBERDIYEV, SALIM S.DAVLATOV

Morphometric characteristics of parts of rat kidney nephron in normal and under the influence of an antiseptician - facility 2 road stimulator on the background of chronic radiating disease

JUR'AT J.BAKHRONOV, SHUKHRAT J.TESHAEV, MUSHARRAF S.SHODIEVA



Clinical Course Of Purulent Soft Tissue Diseases On The Background Of Diabetes Mellitus And Diffusive Toxic Goiter

BAKODIR B.SAFOYEV, OBID.M.KURBANOV, MALOHAT S.SHAROPOVA



Evaluating Glycemic Response to Lidocaine with Two Different Vasoconstrictors in Diabetic Patients Undergoing Tooth Extraction: Crossover Randomized Clinical Study

FERAS SULAIMAN, NURALDEEN MAHER AL-KHANATI, BASSEL BRAD, RUBA JUMAA



Clinical and Angiocalibrometric Changes of Retina Vessels in Patients with Idiopathic Retinovasculitis

USENKO VALENTINA, UMETALIEVA MAANA, GENTSELMAN DMITRY



Assessment of Erythropoietin Levels and Correlation with Cytokines in Patients with Chronic Heart Failure.

, GADAEV A.G, TURAKULOV R.I, QURBONOV A.K, SABIROV M.A, SAYFULLAYEV M.B, GADAEVA N.A



Nano Sponges for The Enhancement of Topical Sustained Delivery of Terbinafine HCl

VISHAL B RAWAL, PREETHI S, ANANYA K V, AMIT B PATIL, DV GOWDA



A Novel Validated Gradient Hplc Method For Analysing Axitinib And Their Process Related Impurities By Pda Detection

SHYAMALA, D.ASHOK, P.SHYAM

Impact of drug information services on patient safety at East Jeddah Hospital in Saudi Arabia; a retrospective study.

AYED A.ALKATHEERI, YOUSEF M.ALJOHANI, AHMAD A.ALSHAMRANI, MANE AL SALIM, NARDEEN BAKHEET, AKRAM A.ALSALMI, YAHYA A.ALZHRANI



A QbD based study in development, optimization and forced degradation behaviour of Epinastine Hydrochloride in Metered dose inhaler by RP-HPLC

, BIKASH RANJAN.JENA, SIVA PRASAD PANDA, UMASANKAR KULANDAIVELU, RAJASEKHAR REDDY ALAVALA, G.S.N.KOTESWARA. RAO, SURYAKANTA SWAIN, DEBASHISH.GHOSE, DEBI PRASAD PRADHAN



Medical and social problems of the development of congenital malformations during a pandemic

DILNOZA SH.KUDRATOVA, GULCHEKHRA A.IKHTIYAROVA, SALIM S.DAVLATOV



Pathomorphological characteristics of the vaginal mucosa in experimental nonspecific vaginitis and various methods of treatment

FERUZA SH.ORIPOVA, GULCHEKHRA A.IKHTIYAROVA, SALIM S.DAVLATOV



Legislation Procedures of Forming Regional Regulations and Its Implication on the Politics of Law in Indonesia

LITA TYESTA ALW, AMALIA DIAMANTINA

Effect of Passive Smoking on Low Birth Weight (Lbw) Incidence in Indonesia: Analysis of Riskesdas Data In 2018

, WULAN SARI RASNA GIRI SEMBIRING, BESRAL, MILLA HERDAYATI



Study The Antibacterial Activity Of Uwi Sap (Dioscorea Alata.L) Extracts From Indonesia In Damaging Escherichia Coli And Staphylococcus Aureus Cells.

, A.NURFITRIANI, META MAHENDRADATTA, AMRAN LAGA, ZAINAL



Prevalence of Depression and Its Determinant Among Diabetic Patients: A Systematic Review from Southeast Asia Countries

NOVITA DHEWI IKAKUSUMAWATI, SUSI ARI KRISTINA, ANNA WAHYUNI WIDAYANTI



Isolation and Characterization of Nitrogen-Fixing Bacteria and Producing IAA (Indole Acetic Acid) From Rice Rhizosphere from The Soppeng Regency

A HERWATI, B PATANDJENGI, M JAYADI4AND MASNIAWATI



3D Printing in Pharmaceuticals: Role of Fused Deposition Modelling (FDM) in Drug Delivery

AHMED M.SHKARA, MOWAFAQ M.GHAREEB



A Prospective study to evaluate the impact of pharmacist counseling in improving inhaler device technique in COPD patients using MDI with spacer and MDI

ETHIRAJAN NANDAGOPAL, M SUMITHRA, N MEENAKSHI

Comparative In Vitro Anticancer Study Of 4-Thiazolidinone Scaffold Bearing Thiadiazole Moiety Derived from Phenolic Aldehydes
NEETU CHOPRA, SANDEEP JAIN, NAVIDHA AGGARWAL



The Severe Varicella Zoster Infection with Kidney Transplant Patient Using Immunosuppressant
MOHAMMAD RUDIANSYAH, RIA BANDIARA, RUDI SUPRIYADI, LEONARDO LUBIS, ENITA RAKHMAWATI KURNIAATMAJA, HENDRA WANA NUR'AMIN, RULLY MARSIS AMIRULLAH ROESLI



Classifications of Eye Injuries
INDIAMINOV SAYIT INDIAMINOVICH, DAVRANOVA AZIZA ERKINOVNA

Preparation, Characterization and In-Vitro Evaluation of Erlotinib Gellan Beads
SOUMIYA SUKUMAR, SANTHIAGU AROCKIASAMY, MANJUSHA CHEMMATTU MOOTHONA

Personalized medicine: A Review on scope and its pitfall
VEERAPPAN MUTHUSAMY, ARAVINDHANATHAN VENKATESAN, ARUN RADHAKRISHNAN, GOWTHAMARAJAN KUPPUSWAMY



Inhibition of Osteoporosis by Endophytes – A Computational Approach
DR.S.DAISYLIN ANBU SUJITHA, CHELLAM JAYNTHY



Awareness of breast cancer and Breast Self-Examination among female Pharmacy professionals in Bengaluru
APOORVA DEV.M, DR.GITHA KISHORE



Quality by Design Approach For Formulation Optimization of Ethosomal Vesicular Carrier of Curcumin
VISHAL KAPOOR, SHAILESH JAIN



Assistance on post market examination and Reporting of problems associated with In-vitro Diagnostic Medical Devices under current health emergency of the COVID-19 pandemic in India
SELLA SENTHIL M, SRUTHI N, ARAVINDHANATHAN VENKATESAN, ARUN RADHAKRISHNAN, GOWTHAMARAJAN KUPPUSWAMY



Problem Focused Coping and Parental Stress in The Autonomy of Oral Self-care for Down Syndrome Children
SITI FITRIA ULFAH, TRI WAHONO, AGUS MARJIANTO



Impact of a pharmacist-led asthma and COPD respiratory clinic in a hospital setting
ELHAM ALSHAMMARI, NADA ALSALEH



Screeening Of Plant Growth Promotion Rhizobacteria (PGPR) to increase local aromatic rice plant growth
SRI SUDEWI, AMBO ALA, BAHARUDDIN PATANDJENGI, MUH. FARID BDR, ABDUL RAHIM SALEH



Thyroid Hormones Profile In Patients with Alopecia Areata, A Single Center Study
MOHAMMAD SHAHATHA NAYAF, AHMED ABDUL-AZIZ AHMED, HAYDER SAAD AHMED, WISAM SUHAIL NAJEM



Redesign of the Legislative Function of the Regional Representative Council of the Republic of Indonesia to Strengthen Regional Autonomy
ZULFAN, RETNO SARASWATI, SUKIRNO, NABITATUS SA'ADAH



Fintech Peer-to-Peer Lending as a Breakthrough in the Acquisition of SME Capital in Indonesia

, ERY AGUS PRIYONO, MUHAMAD AZHAR



Spatial Zoning and Community Partnership on the Development of Coastal and Marine Resources in Tourism Spots of Bali and Lombok

ANA SILVIANA, MIRA NOVANA ARDANI, MAUVAL NOVARAHMAN SATRIA



Ventral dartos flap in second layer of hypospadias, prospective study.

JIHAD ANAD KHALEF, CABU, FIBMS

Determination of Fruit Ripeness Formulations and Sterilisation Processes to Improve the Quality of Crude Palm Oil

, ADI RUSWANTO, ARI HANDONO RAMELAN, IDA BAGUS BANYURO PARTHA, DANAR PRASEPTIANGGA



Classification and prediction of patin fish oil's antioxidant activities from different origins using FTIR spectroscopy and chemometrics

ANGGITA ROSIANA PUTRI, ABDUL ROHMAN, SUGENG RIYANTO, WIDIASTUTI SETYANINGSIH



Effectiveness of Binahong Leaves (*Anredera Cordifolia*) And Vitamin E as Herbal Anti-Inflammatory in Rats (*Rattus Novergicus*) Acute Metritis Based on CD4 Levels and T Lymphocytes

VISKI FITRI HENDRAWAN, LISTYA PUTRI HANDAYANI, GALUH CHANDRA AGUSTINA, YUDIT OKTANELLA, DESI WULANSARI



Cinnamon Leaf Extract to Control Anthracnose Disease on Chilli Plants in Bali: A Novel and New Potential

, ANAK AGUNG KETUT DARMADI, NI LUH SURIANI, IDA BAGUS GEDE DARMAYASA, IDA BAGUS MADE SUASKARA, NI MADE GARI, AHMAD FUDHOLI



Gaps In The Public's Awareness And Protective Practices During Pivotal Time Of COVID-19 Pandemic: A Survey From Indonesia

SUSI ARI KRISTINA, MEITA ANNISA, MAWARDI IHSAN



The Effects Of Eleutherine *Palmifolia* On Depression Behavior, Mda, Bdnf, Serotonin And Norepinefrin Levels In A Rat Model Of Depression

SHERLY LIMANTARA, MASRUROH RAHAYU, NOORHAMDANI, MOCH. ISTIADJID EDDY SANTOSO



Association of Medication Adherence with Quality of Life and Treatment Satisfaction Among Chronic Kidney Disease Patients

, ALEENA ANDREW, SARA JOSE, SUDHA M, VENKATESWARAMURTHY N, SAMBATH KUMAR R, SHANMUGASUNDARAM R



Comparative Study of Entropy Module and Titrated Doses of Propofol For Induction of Anaesthesia.

DR.PREETHI DHAMOTHARAN M.B.B.S, DR.SONAL BHAT, DR.SHAILA S KAMATH



Identification of Phenolic Compound from Active Subfraction Of *Baccaurea Racemosa* Pulp by High Resolution Mass Spectrometry

LINA PERMATASARI, SUGENG RIYANTO, ABDUL ROHMAN



Efficacy of Escitalopram versus Desvenlafaxine in Treatment of Depression:

A Comparative Study from a Rural Tertiary Care Hospital

, DR. SAIKIRAN PASUPULA, DR. MOUNICA YEDLAPALLI, DR. RAJESWARI PASUPULA, DR. SAKA MEGHANA, DR. SURESH KUMAR KOTA



Effect of seed priming with polyamines on Barley(Hordeum Vulgare L.)

, WARQAA MUHAMMED SHARIFF AL-SHEIKH



Cinnamaldehyde's Potential Inhibitory Effect towards Planktonic and Biofilm of Oral Bacteria

DIYAH TRI UTAMI, SYLVIA UTAMI TUNJUNG PRATIWI, TETIANA HANIASUTI, TRIANA HERTIANI



Antimicrobial Activity of Oleuropein and Thyme Extracts Against Selected Pathogenic Microorganisms and their Potential Uses as Natural Preservatives

YOUSSEF SAHOURY, HANI NASEEF, MOHAMMAD FARRAJ, MOAMMAL QURT, LINA EL- KHAIRY



Free radical scavenging activity of methanol extract and compounds isolated from stems of Etlingera rubroloba A.D Poulsen

ASRIULLAH JABBAR, SUBAGUS WAHYUONO, I SAHIDIN, IKA PUSPITASARI



Ocular Complications in Type 1 Diabetes

ANAHITA ZAKERI, HABIB OJAGHI, MANOUCHEHR IRANPARVAR ALAMDARI, FIROUZ AMANI, MONIR SHOAA, TELMA ZAHIRIAN MOGHADAM

The Outcome of Partial Arthroplasty for Treatment of Type 1 Intertrochanteric Fractures in Iraqi Elderly Patients

RAAD JAWAD KADHIM



Laparoscopic and Open Burch Colposuspension For Stress Urinary Incontinence: Advantages / Disadvantages

AHMED ALI OBAID, SHIREN ALI AL-HAMZAWI, AHMED ABDUL AMEER ALWAN

The Protective Effect of Boswellia Against Carbimazole Incuced Renal And Hepatic Toxicity on Male Rats

AMAL UMRAN MOSA, IMAN HUSSEIN NASER, BAN HOSHI KHALAF



Synthesis of Some Azetidinone Derivatives Containing Ciprofloxacin Moiety

FADHIL D.KHALID, AYAD S.HAMAD, RABIHA H.SALEH, MAHA M.SALIH

Development of Oral Self-Nanoemulsifying Drug Delivery System (SNEDDS) Of Rosuvastatin Calcium: Formulation, Characterization, And In-Vitro Drug Release Study

ADNAN BURHAN QADER, AHMED ABBAS HUSSEIN



Descriptive Study of Hemophilia Person's Life and Care in Aldiwanyah Province/Iraq

ABDULAZIZ WANNAS ABD, SUZAN SABBAR, MUTLAG



How Do Hereditary and Parents Influence the Trend of Drug Use in High School Students in Banda Aceh? Multiple Logistic Regression

TALAMSYAH, HIZIR SOFYAN, HERU SANTOSA, HAJJUL KAMIL, DEWI MARIANTHI



The Influence of Cigarette Smoking in Immunoglobulin-E and Interleukin-33 Levels in Iraqi Smokers

SHEREEN AL-ALI

Study the Antibiotics Activity Against Escherichia Coli Isolated from Urine Samples of Pregnant Women with Urinary Tract Infection

EHSAN F.HUSSEIN, JABBAR A.AMEEN, SALAH H.YASSEN



Serum Hepcidin And Ferritin Level Changes In Iraqi Adult Patients With Non-Transfusion Dependent Beta-Thalassemia Major And Intermedia

EHAM AMER ALI, ALI ABDULATEAF ALBAYATI, SAHAR ABDULWAHAB ALSHABAN, KHITAM ALI ALTHAMER



Prevalence of Oral Mucosal Lesions Among Elderly Population in Basrah Governorate: A Retrospective Study

ZAINAB ABDULKAREEM MAKTOOF, OULA FOUAD HAMEED, SHATHA KH.HUSSAIN



Incisional Hernia, Different Approaches, The Defect Size Is the Referee

ADIL SHAKER AL TAMIMI, ISRAA ABDUL WAHED DHEEB



Molecular Identification of Fusarium Brachygibbosum And Some Isolates of Trichoderma Spp.

ALI A. ODEH, RAJAA G.ABDALMOOHSIN, AQEEL N.AL-ABEDY



Prevalence and Antifungal Susceptibility of Vulvovaginal Candidiasis in Female Genital Tract

MUSTAFA SALAM ABDULKHALEQ NOAMAN, MUTHANA ABDULKADER ALMAHDAWY



Prevalence of Bacterial Vaginosis Among Women in Diyala Governorate by Using Amsel's Criteria and Nugent's Scores

ZUHAIR HASSAN ALWAN, MUTHANNA AL-MAHDAWI, SHAYMAA MOHAMMED ALWAN



Myristica Fragrans seeds extract mitigate non-motor behavioural deficits and oxidative stress in Rotenone model of Parkinson's disease

MUTHUVEL VIJAYAN KANAGASABAPATHY, SUMANA RADHAKRISHNAN, PRABHU K, RAJASANKAR SRINIVASAGAM



An approach of the plant Mesua Ferrea Linn for the venom induced consumption coagulopathy (VICC), caused by the snake Echis Carinatus (Russel viper)

SIVAKUMAR.B, KAILASAM KOUMARAVELOU

The Effect of Extracts of Annona squamosa on Protoscolices in Echinococcus Granulosus in Vitro and in Vivo.

FADEL Y.S.AL-ARABI, MANSOUR ABDULNABI H. MEHDI, GOZIF MOHAMMED N.OMER, AIDAH M.ALI, MAZAHAR FAROOQUI, VIDYA PRADHAN

Nature of oral cancer progression according to gender, evaluation through metastasis and recurrence - A Single University Study

SINDHU PRIYA KUPPUSAMY SUNDARA MURTHY, DR.MAHATHI.N, DR.SURESH



Prevalence of class I occlusion in mixed dentition

NIVETHA G, ARVIND S



Age and gender related distribution of patients undergoing maxillary third molar extractions	✱
SAM JOHN KOSHY, MADHULAXMI M, SIVAKUMAR M	
Knowledge attitude and awareness of platelet rich fibrin among dental students in chennai	✱
ABHISHEK NARAM, MEBIN GEORGE MATHEW, DEEPAK S	
Evaluation of the awareness of gingival recession amongst patients who underwent root coverage treatment - A retrospective study	✱
VUNNAM SRI SAI CHARAN, NASHRA KAREEM, KIRAN KUMAR PANDURANGAN	
Prevalence of Oral Submucous Fibrosis among Tobacco Users reporting to a Private Dental College in Chennai: A Retrospective Study	✱
DYNA ALBERT, M R MUTHUSEKHAR, KATHIRAVAN SELVARASU	
Assessment of distribution pattern in patients with facial pain - a retrospective study	✱
JOSHINI SHANMUGAM, SREEDEVI DHARMAN, SURESH V	
Gingival health of children suffering from haemophilia	✱
JAYA KEERTHANA S, MEBIN GEORGE MATHEW, MARAGATHAVALLI. G	
Evaluation of initial shade of the discoloured non vital tooth amongst patients in chennai- a retrospective study	✱
MADHURA DESHMUKH, NABEEL AHMED	
Seratiopeptidase vs methylprednisolone in the reduction of pain after the extraction of mandibular third molar	✱
HARINI G, DR.DINESH PRABHU, DR.BALAKRISHNAN R N	
Prevalence of commonest form of cleft lip in patients reported to a university hospital setting - a retrospective analysis	✱
LAKSHYA RANI.S, DR. SENTHIL MURUGAN.P, DR.G.MARAGATHAVALLI	
Estimation of scaling done during the course of fixed orthodontic treatment - A retrospective study	✱
VUNNAM SAI CHARAN, NASHRA KAREEM, KIRAN KUMAR	
Prevalence of fluorosis in patients undergoing orthodontic treatment- a retrospective study	✱
ASHFAQ AHMED M, SRIRENGALAKSHMI, SARAVANA DINESH.S.P	
Preference for evaluating marginal fit in framework trial of coping in fixed dental prosthesis - a retrospective study	✱
DR.NEPPALA GOWTHAM, DR.NABEEL AHMED	
Prevalence of chronic gingivitis and its relationship with oral hygiene status- a retrospective study	✱
J SARVESH KUMAR, N D JAYAKUMAR, MURUGAIYAN ARUN	
Periodontal status among patients with hypothyroidism visiting a private dental hospital in chennai	✱
JANHVI MANOHAR, PRADEEP KUMAR R, S.P.SARAVANA DINESH	

Evaluation of periodontal health status of teeth with prosthetic crowns - a retrospective cohort study

KEERTHANA BALAJI, MURUGAN THAMARAISELVAN, PRADEEP D



Knowledge, attitude and practice among dentists on the factors causing failure of post & core restoration in endodontically treated teeth - a questionnaire-based survey

SOWMYA K, SURENDAR SUGUMARAN



Assessment of impacted third molars in patients with temporomandibular disorders

JAYA KEERTHANA S, SREEDEVI DHARMAN, MARAGATHAVALLI.G



Prevalence of different types of expansion appliance usage for maxillary expansion

*, ARATHI MURUGESAN, SARAVANA DINESH S.P, NIVETHIGAA
BALAKRISHNAN*



Prevalence of root stumps in adolescents

WESTEOUS DOMINIC PEREIRA, DHANRAJ GNAPATHY, SURENDAR S



Prevalence of different facial shape in chennai population

HARIPRIYA.R, NIVETHIGAA.B



Different Treatment Options for A Distal Extension Case: A Retrospective Study

AMAN MERCHANT, SUBHABRATA MAITI, VISALAKSHI RAMANATHAN



Prevalence of Patients Seeking Aesthetic Treatment Options in Orthodontics - A Retrospective Study

, MATHEW THOMAS MALIAEL, M. NAVEEN KUMAR



Incidence of Maxillary Tori and Mandibular Tori in Complete Denture Patients In SDC

S.SIVAHARINI, DR. RAKSHAGAN, DR. VIVEK NARAYAN



Candidiasis Associated with Steroid Therapy in Oral Lichen Planus Patients Visiting A Private Dental Institution

ABARNA JAWAHAR, G. MARAGATHAVALLI, MANJARI CHAUDHARY

Evaluation of Patients Reporting with Burning Sensation and Non-Specific Clinical Findings to Department of Oral Medicine

ABARNA JAWAHAR, G. MARAGATHAVALLI, MANJARI CHAUDHARY



Assessment of Effectiveness of Local Anesthesia with And Without Adrenaline in Patients with Cardiac Disorders

*MANIVASAGAM DEEPIGAA, MUTHUKRISHNAN ARVIND, CHAUDARY
MANJARI*



Anemia as An Etiological Agent for Oral Squamous Cell Carcinoma - A Retrospective Study

MANIVASAGAM DEEPIGAA, MUTHUKRISHNAN ARVIND, CHAUDARY MANJARI

Prevalence of Trigeminal Neuralgia in Patients Reported to Private Dental Institution.

MUKUNDH CHAITHANYA.V, UMA MAHESWARI.T. N, MANJARI CHAUDHARY



Clinical Characteristics of Oral Lichen Planus in Patients Visiting A Private Dental Institution - A Retrospective Study. <i>NIVETHITHA.R , ARCHANA SANTHANAM, S.P. SARAVANA DINESH</i>	✱
Association Between Angles Class Ii Malocclusion and Periodontal Disease - A Retrospective Study <i>KARTHIGA DEVI GANGA MOORTHY, JAIGANESH RAMAMURTHY, PRADEEP DHASARATHAN</i>	✱
Comparative Evaluation of Caries Affecting Primary and Permanent Mandibular First Molar in Children Visiting A University Dental Hospital <i>PRIADARSINI T, EMG SUBRAMANIAN, GANESH JEEVANANDAN, DHANRAJ GANAPATHY</i>	✱
Dental Caries Experience in Children with Congenital Heart Disease Visiting A Private Dental College <i>PRIADARSINI T, EMG SUBRAMANIAN, DHANRAJ GANAPATHY</i>	✱
The Incidence of Squamous Cell Carcinoma and Its Variants in An Outpatient Population Visiting A Dental College <i>ASWANI.E , DR. GHEENA.S</i>	✱
Clinical and Demographic Characteristics of Oral Lichen Planus - A Retrospective Study <i>KARTHIGA DEVI.G, DEEPIKA RAJENDRAN, PRADEEP D</i>	✱
Prevalence of odontogenic keratocysts among patients in a university hospital setting <i>HARRITA.S , SENTHIL MURUGAN P</i>	✱
Retrospective Study to Analyze Prevalence of Intravenous and Oral Antibiotics in Space Infection <i>, AMINA MEHRIN BANO, HEMAVATHY O.R, SRIRENGALAKSHMI</i>	✱
Assessment of Dental Management of Mentally Challenged Patients Treated in Special Care Dentistry in A Hospital Setting- Retrospective Study <i>MUKUNDH CHAITHANYA.V, UMA MAHESWARI.T. N, MANJARI CHAUDHARY</i>	✱
Prevalence of White Spot Lesions in Patients Treated with Fixed Orthodontic Appliances <i>AMINA MEHRIN BANO, SRIRENGALAKSHMI</i>	✱
Evaluation of Factors Leading to Full Mouth Rehabilitation for The Patients Visiting A Private Dental Hospital: A Retrospective Study. <i>KARTHIK EVG, SUBHASHREE R, UMA MAHESHWARI T.N</i>	✱
Prevalence of Skeletal and Dental Malocclusion- A Retrospective Study in University Setting <i>VISHNU PRASANNA.S.G, SARAVANA DINESH. S.P</i>	✱
Periodontal Status Among Tobacco Users Visiting A Dental Hospital <i>KIRTANA GOPALASAMY, PRADEEP KUMAR.R, PRADEEP D</i>	✱
Surgeon's Preference and Application of Surgicel And Buccal Pad of Fat in Primary Palatoplasty-A Retrospective Study <i>FAAZILA FATHIMA, SENTHIL MURUGAN P</i>	✱

Prevalence Of Vestibular Recession In Mandibular Incisors After Orthodontic Treatment	*
AMINA MEHRIN BANO, S.P. SARAVANA DINESH, SRIRENGALAKSHMI	
Analysis Of Partial Edentulism Of Kennedy's Class Iii Classification Based On Gender And Arch- A Retrospective Study	*
MOHAMAD QULAM ZAKI BIN MOHAMAD RASIDI, KIRAN KUMAR PANDURANGAN, DINESH PRABU	
Oral Cancer And Association With Forms Of Tobacco Use Among Patients Visiting A Dental Institution In Chennai- A Retrospective Study	*
GOKUL GUNASEKARAN, PRADEEP KUMAR.R, SRI RENGALAKSHMI	
Quantification of operculectomy procedures performed using laser versus surgical method-an institutional based study	*
MILONI SURESH SHAH, NASHRA KAREEM, MARAGATHAVALLI GOPAL	
Evaluation Of Incidence Of Palatal Fistula Cases In University Hospital Setting - A Retrospective Study	*
MILONI SURESH SHAH, SENTHIL MURUGAN P, MARAGATHAVALLI GOPAL	
Knowledge, Attitude And Practice Among Undergraduate Dental Students On Prescription Of Antibiotics In Dentoalveolar Abscess - A Survey	*
DHANVANTH.M1, 3, DEEPIKA RAJENDRAN, UMA MAHESWARI.T.N	
Evaluation Of Condylar Morphology In Skeletal Open Bite And Deep Bite Cases	*
H.SRUTHI , SRIRENGALAKSHMI	
Assessment Of Motor Performance In Right Handed And Left Handed Persons	
KAMALLI.M , G.SRIDEVI, MRS.S.SANGEETHA	
Awareness About The Effect Of Ocean Warming On Marine Species	
SNEKA.S , R.GAYATRI DEVI	
Applications of biotechnology in waste management	
M.INFANT RESHAWN, DR.KAVITHA S, ABILASHA.R, VISHNU PRIYA.V, GAYATHRI R	
Knowledge And Survey On Autism Among Parents	*
B.MADHUMITHA , KAVITHA S, ABILASHA R, V.VISHNUPRIYA, R. GAYATHRI	
Does The Lockdown Helps To Build Quality Time Within Family	*
DIVYA DHARSHINI.A, A.K.ANJALI, MURALIDHARAN N.P	
Association Between Eating And Weight Related Disturbances And Depression Among Adolescent And Young Aged Student Population	*
SRIVATCHAVA.S , KARTHIK GANESH MOHANRAJ, V.VISHNU PRIYA	
Comparison Of Oral Hygiene Status Between Children With And Without Deleterious Oral Habits- Case Control Study	*
PAVITHRA H.DAVE, MAHESH RAMAKRISHNAN	
Prevalence Of Type Of Maxillary Labial Frenal Attachment Among 18-30 Years: A Retrospective Study	*
JITESH.S , ARVINA RAJASEKAR, MADHULAXMI M	

Precautions Taken By The General Public During Covid-19 Pandemic Associated Lockdown Period In The Suburbs Of Chennai City - A Survey

DR.NANDINI PALANIVEL, DR. KEERTHI SASANKA, DR. S. GHEENA, DR. DHANRAJ GANAPATHY



Association of Crown Discolouration and Pulpal Status of Traumatized Primary Tooth in 3 to 8 year old children-A Retrospective study

NUR QISTINA BINTI AHMAD FAUZI, DEEPA GURUNATHAN

Prevalence Of Pit And Fissure Caries In Male And Female Children

TRISHALA, GANESH JEEVANANDAN, ARTHI B



Frequency Of Patients Undergoing Tooth Coloured Class 2 Inlay Restorations Attending A Dental College

RACHEL PAUL, RAGHU SANDHYA, DEEPA GURUNATHAN

A Retrospective Study on Redoing Jaw Relation in Complete Denture

NUR QISTINA BINTI AHMAD FAUZI, ASHOK V, DEEPA GURUNATHAN



Occlusal Interferences During Removable Partial Denture Insertion – A Questionnaire Survey.

NUR QISTINA BINTI AHMAD FAUZI, ASHOK V, DEEPA GURUNATHAN



Awareness And Knowledge About Pharmacotherapy Of Angular Cheilitis Among Ug Dental Students In Private Dental College Chennai.

VINAYA SWETHA.T, DR.DEEPIKA RAJENDRAN, DR.KIRAN KUMAR PANDURANGAN



A Retrospective Study On Evaluation Of Patients With Recurrent Aphthous Stomatitis

REVATHI.B, DEEPIKA RAJENDRAN, KIRAN KUMAR PANDURANGAN



Pax Gene Mutations Associated With Cleft Lip And Cleft Palate

SUDARSAN R, J.VIJAYASHREE PRIYADHARSINI, ANJANEYULU K



Is Temperature And Relative Humidity Playing A Vital Role In Checking The Spread Of Covid - 19 Pandemic In India

PRANEEKSHA.R, DR.GANESH LAKSHMANAN, DR.R.GAYATRI DEVI



Myristica Fragrans seeds extract mitigate non-motor behavioural deficits and oxidative stress in Rotenone model of Parkinson's disease

MUTHUVEL VIJAYAN KANAGASABAPATHY, SUMANA RADHAKRISHNAN, PRABHU K, RAJASANKAR SRINIVASAGAM



An approach of the plant Mesua Ferrea Linn for the venom induced consumption coagulopathy (VICC), caused by the snake Echis Carinatus (Russel viper)

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The Effect of Extracts of Annona squamosa on Protoscolices in Echinococcus Granulosus in Vitro and in Vivo.

FADEL Y.S.AL-ARABI, MANSOUR ABDULNABI H.MEHDI, GOZIF MOHAMMED N.OMER, AIDAH M.ALI, MAZHAR FAROOQUI, VIDYA PRADHAN

Comparing western therapies with eastern therapies in order to prevent and treat asthma in vietnam

DONG THI THAO NGUYEN

Treatment of hepatitis b with the support of phyllanthus urinaria

LE MINH QUANG



Applying some effective therapies and scientific compositions of passifloraceae in the treatment of neurasthenia

, HUYNH TAN HOI

Prognostic importance of hyponatremia in acute st- elevation myocardial infarction

DR.A.T.PARDESI, DR.DILIP P.PATIL, DR.RAHUL PATIL, DR.MAKARAND B.MANE



A study to determine angiographic findings in patients of acute coronary syndrome at teaching Hospital

DR.MRS.PATIL SHILPA, DR.MRS.PATANGE APARNA, DR.MRS.VASANT DEOKAR, DR.MRS.KAPALE R.J, DR.MRS PUJARI BHUPAL



Effect of iron deficiency anemia on glycosylated hemoglobin (HbA1c) values in non-diabetes

DR.DANIEL P.JHON, DR.JABBAR DESAI, DR.AMIT PORWAL, DR.MRS.KAPALE R.J, DR.U.T.MANE



A study of microalbuminuria in newly detected hypertensive individuals in tertiary care centre

DR.S.S.KULKARNI, DR.U.T.MANE, DR.PUJARI BHUPAL, DR.RAHUL S.PATIL

Chemometrics-Assisted UV Spectrophotometric Method for Simultaneous Determination of Paracetamol and Tramadol in Divided Powder Dosage Form

DINA CHRISTIN AYUNING PUTRI, MICHAEL RAHARJA GANI, FLORENTINUS DIKA OCTA RISWANTO



Diuretic effect of aqueous extracts of Vitex agnus castus leaves and seeds in Wistar Albinos rats

FATIMA EL KAMARI, HASSAN LAAROUSSI, DRISS OUSAAID, YASSINE EL ATKI, AMAL TARQQ, IMANE AOUAM , BADIAA LYOUSSI, ABDELFATTAH ABDELLAOUI



Study of flavanoid determination of uwi sap extract (Dioscorea alata.L)

NURFITRIANI.A, META MAHENDRADATTA, AMRAN LAGA, ZAINAL

α -Glucosidase inhibition and molecular docking studies of butyrolactone I derived from Aspergillus terreus and evaluation of its acute toxicity

, RIZNA TRIANA DEWI, TENI ERNAWATI, HANI MULYANI, AKHMAD DARMAWAN, INDAH DWIATMI DEWIJANTI, SOFNA BANJARNHOR, TRI YULIANI, MARISSA ANGELINA, SOFA FAJRIAH, ABDI WIRA SEPTAMA



HPMC Polymeric System: Structural Contribution in Controlling Drug Release in Sustained Drug Delivery System

AJIT KULKARNI, VIPUL DHASADE, VIVEK INGALE, AMIT KASABE, ARCHANA YADAV, SANTOSH FATTEPUR, NAGARAJA SREEHARSHA, E.BHAVYA

Drug-Induced Acute Pancreatitis

ANURAG LAVEKAR, UMESH MARAPPA, SWARALI TADWALKAR, VIVEK CHAUDHARI

Comparative Study Of Amino Acids Profile Of Eel Fish (Anguilla Bicolor) In The Yellow Eel And Silver Eel Phase From Lake Poso

JAMALUDDIN, NUR'AENI, AGUSTINUS WIDODO, WA ODE SITTI MUSNINA



Physical Chemistry Characterization of Gelatin on Eel Fish Bone (Anguilla marmorata Q. Gaimard) With Various Concentrations of Solvent Base and Extraction Time

JAMALUDDIN, AKHMAD KHUMAIDI, RAODHATUL JANNA, YONELIAN YUYUN, AGUSTINUS WIDODO, PITRIANI



Correlation between Serum Bisphenol-A Level, Luteinizing Hormone (LH), Follicular Stimulating Hormone (FSH) In a Sample of Iraqi Women with PCOS

HANEEN SUBHEE SHAHEED, WASSAN ABDUL-KAREEM ABBASS, SUZAN YOUSIF JASIM



The Rationale For Performing Hybrid Mediastinal Lymph Node Dissection By Transhiatal Access For Thoracic Esophageal Cancer

DJAKHANGIR SABIROV, BAKHTIYOR MADIYOROV, ABDUGAFFAR RASULOV, NIZOM ERMATOV, ORZIGUL YUSUPOVA



Effect Of Dietary And Lifestyle Transitions On Functional Immune System

SARAH MOHAMED, R S UPENDRA, SHRADDHA BIJALWAN, VAISHNAVI BHAGWAN BOPTTE, ABHINASH KUMAR GIRI



Title: Updates on community pharmacists' involvement in tuberculosis program in Indonesia

SUSI ARI KRISTINA, AMADEA SYLVA LIENANINGRUM, ANNA WAHYUNI WIDAYANTI



Xanthine Oxidase Inhibitory Activity and DPPH radical scavenging Assay of isolated compound from Etlingera rubroloba (Blume) A.D Poulsen stem

ASRIULLAH JABBAR, SUBAGUS WAHYUONO, I SAHIDIN, IKA PUSPITASARI



2d-Qsar Study Of Synthesized Novel Derivatives Of 1,3,4-Oxadiazoles

SOMASHEKHAR M, R B KOTNAL, S R KARAJAGI

Molecular and Atomic Absorption Spectrophotometric determination of Furosemide via complex formation with Chromium ion

KHITAM JABER NABHAN, ABBAS SHEBEEB HASAN AL-KADUMI, JWAN ODAY ABDULSATTAR



Direct and Indirect Cost of Diabetes Mellitus in Indonesia: A Prevalence Based Study with Human Capital Approach

SUSI ARI KRISTINA, DWI ENDARTI, TRI MURTI ANDAYANI, ANNA WAHYUNI WIDAYANTI



Identification of Bioactive Compounds from Seeds Oil of Agricultural Waste in Malaysia

SHAKINAZ DESA, ASAAD ABBAS KHALAF, SYARUL NATAQAIN BINTI BAHARUM, MUSTAFA MUDHAFAR



Tribulus terrestris Linn Attenuates Neurotoxicity Induced By Monosodium-Glutamate: An In Vivo Evidence

GOMATHI SWAMINATHAN, SRIKANTH JUPUDI, SATHISH R, ROSHAN NS



Clinical and experimental value of integrated lymphatic therapy in nonspecific ulcerative colitis

YULDOSHALI EGAMOV, AKHTAM RUZIYEV, SARVAR KHAIDAROV, GULI SHAYKHOVA, ADILBEK RAJABOV, NIZOM ERMATOV

Protective Effects of Antagonism of Interleukin-1 Receptors in 3-nitropropionic Acid Provoked Huntington Disease-Related Symptoms

SURBHI GUPTA, BHUPESH SHARMA



The Correlation between Serum Iron Level and Transferrin Saturation with Reticulocyte Hemoglobin Equivalent (RET-He) in Routine Hemodialysis

MOHAMMAD RUDIANSYAH, RUDI SUPRIYADI, LEONARDO LUBIS, RIA BANDIARA, ABDUL HADI MARTAKUSUMAH, RULLY MARSIS AMIRULLAH ROESLI, DEDI RACHMADI



Antileukotriene Drugs in The Treatment of Atopic Dermatitis in Children

MIRRAKHIMOVA MAKTUBA XABIBULLAYEVNA, ABDULLAEVA DILOROM TELMANOVNA, ABDULLAEVA DILAFRUZ GAYRATOVNA, SAGDULLAYEVA MAFURA ABDUKARIMOVNA, ABDULLAYEVA MUXLISA MASRUROVNA



Efficacy of Sodium Bicarbonate Versus Normal Saline in the Prevention of Contrast-Induced Nephropathy among Cardiac Patients: A Cohort Study in Saudi Arabia

SIREEN ABDULRAHIM SHILBAYEH, ATHEER MUSAAD BIN HAMEED, MAY MOHAMMED ALOWAYEDH, RAGHAD ABDULMOHSEN ABAHUSSAIN, HAYA ALI MUKHAYLIB, HIND KHALID SID AHMED

Type 2 Diabetes Mellitus and Its Effect on Quality of Life among Adolescent Population: A Retrospective Cohort Study in Saudi Arabia

SIREEN A. SHILBAYEH, WEDYAN A. ALHUSSAIN, ALANOUD S. ALHIBS, NAJLA G. ALMALKI, NOUF A. ALMAJHAD, SAMAR T. NOURI, SARAH M. ALSALEH



Maximal Matching in Fractal Graphs and Its Application

P THARANIYA, G. JAYALALITHA



Anticancer properties of hymecromone-derived compounds: A review

NOORA THAMER ABDULAZIZ, YASSER FAKRI MUSTAFA



Synthesis and evaluation of antibacterial and antifungal activity of new 1,5-Benzodiazepine derivatives contain Cyclic imides and Mannich bases.

MALATH KHALAF RASHEED, DIANA ABDALKREEM.AL-RIFAIE, DHAMER ISMAEL MADAB



Componential Description Of Medicated Foams: A Review

HAYDER HUSSEIN ALWAN, HANAN JALAL KASSAB



Molecular Study Of The TG Gene Polymorphisms ?In Patients With Hashimoto's Thyroiditis Among Iraqis Population

BASMAN A. NADHIM, ABBAS G. HAMMED, HAYDER O. HASHIM, NAZAR J. METIB



Comparative genetic study for some species of the family Poaceae using the RAPD molecular indicator

SALWAH HAMZA HUSSEIN AL-HASSNWIY, RUQAYA MANOON HASAN AL-NOMANI

Quercetin Isolated from Dried Ginkgo Biloba leaves with the Phytochemical Screening

FARQAD M. BAQER, BASSAM A. HASSAN, FADIL MOHSEN HAMED

Therapeutic efficacy of protein compound extraction from *Metapenaeus affinis* against glucosamine sulphate-induced nephrotoxicity in male rats

AMAL K.ABBAS

Evaluation of HER2-Neu status by immunohistochemistry and fluorescence in situ hybridization as a prognostic factor in gastric and gastro-esophageal cancer

EAMAN SUUD KHALIFA, AYSER HAMEED LATIF

Can IL1B and IL10 levels assessment in endometrial secretion predict pregnancy outcome after ICSI? A prospective study.

TAIF EIMAD AHMED, FADIA J AL-IZZI, QAYS AHMED MAHDI



Synthesis and Characterization of New Schiff Base Ligand Derived from 4-aminoantipyrine and its complexes with some metal ions and Their Fluorescence Study

INAM HASHIM IBRAHIM, HASAN A. HASAN

Seroprevalence of Toxoplasma Gondii Infection among Pregnant Women in Al-Anbar Governorate Western of Iraq

IBRAHIM N.S AL-KAISSI, SAAD M. SHUKR, MARWA A. KUBBA



New Polymeric Coii, Ni(II) And Cd(II) Complexes With Tetrazole Schiff-Base Ligands; Synthesis, Spectral Characterisation And Biological Activity

RIYADH M. AHMED, BAIDAA K. AL-RUBAYE, NASRY J. HUSSIAN, ENAAM I. YOUSIF, HASAN A. HASAN, MOHAMAD J. AL-JEBOORI

Evaluation of the Cytocompatibility of Novel Gingival Retraction Pastes based on Boswellia papyrifera

HIBA A. SALMAN, MANHAL A. MAJEED, EAMAN A. AL-RUBAEE



Isolation and genotyping of local Toxoplasma gondii strains in infected chicken

ABDULRAZZAQ MOHAMMED HAMOOD, ALI MOHAMMED ABED

Preparation and characterization of diazepam loaded nanomicelles for pediatric intravenous dose adjustment

MUHANNAD SALAH AL RADHI, MOHAMMED SABAR AL-LAMI, ENAS ABDULSAHIB



Baseline Widal Titre Amongst the Healthy Individuals from Western Rural Maharashtra, India

, DR. RAVINDRA V. SHINDE, ANJALI R. SHINDE, DR. S. T. MOHITE, DR. SANDEEP B. SHINDE, DR. S. K. PAWAR, DR. S. R. PATIL

IoT BASED CPAP MACHINE

J.PREMKUMAR, T.SUDHAKAR, ABDULLAH S, ABHIJIT GOSWAMI, E.KAVITHA



To the Problem of Fungal Pathology in the Hot Climate in Children and Adults

SHAIKHOVA GULI, ERMATOV NIZOM, ABDULLAEVA DILAFRUZ, ABDULLAEVA DILOROM, YUSUPOVA ORZIGUL, ALLAYEVA MUNIRA



Effect of Tender Coconut Water on Experimental Urolithiasis: An In Vitro Study

GAYATRI S, SOWNDARYA S, KARTHIKEYAN G

Development and Optimization of Multiple-Unit Floating Drug Delivery System of Pregabalin Using Quality by Design (QbD) Approach

MONIKA KHARB, Y.S.TANWAR



Dissolution profile comparison of two marketed Favipiravir tablets

SANDEEP KHATALE, CHAUDHARI NIKHIL SURESH, ANAGHA UPASANI, NILAM BHUSARE



Development of a Tool to Assess the Safe and Quality Use of Immunization

JUNY SEBASTIAN, GURUMURTHY PARTHASARATHI, MANDYAM DHATI RAVI

Effectiveness of Olive Oil Massage on Post Caesarean Pain and Quality of Sleep among Primigravida Mothers

PRIYADARSINI A, REVATHI, P.G



Assessment of the Quality of Life and the Level of Depression in Patients with Chronic Kidney Disease on Programmed Hemodialysis

AKSANA M. KARDANGUSHEVA, LILIYA V. ELGAROVA, ZARINA A. SHUGUSHEVA, IRINA H. ALMOVA, SOFIAT KH.



The Expression of Immunohistochemistry IL-10 And IL-18 On Helminth-Infected Mice Treated With The Extract Of Areca catechu L.

ENDY JULI ANTO, AZNAN LELO, SYAFRUDDIN ILYAS, MARLINE NAINGGOLAN



Evaluation of Basic Plants in The Bank of Healthy Potato Varieties in The Northern Region and The High Mountain Zone

OVES E V

An objective assessment of the importance of regions for beekeeping based on melliferous resources and ambient temperature

V.N.KULAKOV, A.G.MANNAPOV

Reappraisal of the Effect of Helicobacter pylori Eradication Treatment on Rosacea in Iraqi Patients

SAMER A DHAHER



Construction and Validation of Ayurveda Health Assessment Questionnaire (AHAQ) Based on Characteristics of Health (Arogya Linga) Mentioned by Acharya Kashyapa

DR. SAURABH AGRAWAL, DR.SHIVAKUMAR, DR.M.B.KAVITHA, DR.ASHA KP



Development and Evaluation of Orodispersible Film Loaded with Ibuprofen Nanoparticles

VISHAL B RAWAL, AFRASIM MOIN, SUBHAM JAIN N, AMIT B PATIL, MEENAKSHI S, SIDDARAMAIAH, NITHIN K S, D V GOWDA



Formulation and Evaluation of Polymeric Orodispersible Tablets Contains Ibuprofen Loaded Microfiber for Better In-Vitro Dissolution

SUBHAM JAIN N, AFRASIM MOIN, VISHAL B RAWAL, AMIT B PATIL, MEENAKSHI S, SIDDARAMAIAH, NITHIN K S, D.V. GOWDA

Co-Amorphous Based Supersaturated Urea-Losartan Potassium Transdermal Formulation For Hypertension

NANHI NANDINI, AFRASIM MOIN, ROHINI BHATTACHARYA, MEENAKSHI S, SIDDARAMAIAH, SATHISHBABU P, NITHIN K S, D V GOWDA

Characterization and Formulation of Transdermal Drug Delivery System of Piroxicam

ROHINI BHATTACHARYA, AFRASIM MOIN, NANHI NANDINI, MEENAKSHI S, SIDDARAMAIAH, SATHISH BABU P, NITHIN K.S, D V GOWDA

Identifying gene clusters as signature biomarkers for predicting methotrexate effectiveness and potential side effects during Rheumatoid Arthritis therapy

ANAS KHALEEL, AFNAN MEQBEL, ROWAN ALEJIELAT, YAZAN S. BATARSEH, ABDALLAH A. ELBAKKOUSH, BAYAN Y. GHANIM, CRISTINA I. BATARSEH, NIDAL A. QINNA



Recent Trends on Regulatory Aspects of Nanotechnology in Indian Pharmaceutical Market

DAKA NAGARJUNA REDDY, DR MAHAVEER SINGH, DR BIRENDRA SHRIVASTAVA, DR KONDA RAVI KUMAR

Toxicopathological And Biochemical Impacts Of 2,3,7,8 Tetrachlorodibenzo-P-Dioxin (TCDD) On Liver Of Albino Male Rats

ANAS A.HUMADI, SAMER I. SABEEH, BUSHRA I. AL-KAISEI, ALI IBRAHIM ALI AL-EZZY



Characterisation Of Encapsulated Beta Vulgaris Linn.Dry Powder Extract In Chitosan

SANGGITA AYU IKASARI, ANITA SUKMAWATI



The effect of giving wameroose juice for high blood pressure of patients hypertension in Palembang

MUZAKAR, LISTRIANAH, PRATIWI B.I, AHMAD FUDHOLI



Antimalarial Properties of Streptomyces hygroscopicus subsp Hygroscopicus Secondary Metabolite Active Fractions: In Silico and In Vivo Analysis

LOEKI E FITRI, AJENG M PUTRI, NABILA E ERWAN, FITRIA F PUTRI, RIVO Y B NUGRAHA, TEGUH W SARDJONO, KANA MARDHIYYAH, DIO G ARIEL, ICHA F D FARATISHA, SUCIATI, BACHTIAR R P IHSAN, SRI WINARSIH



Identification of foodborne pathogens and antibacterial activity of ethanolic extract of Alangium salviifolium

MOUNICA SURA, SREENATH KONANKI, SREEYAPUREDDY ANITHA, D.S. RAO, JAYASIMHA RAYALU DADDAM



Analytical Method Validation and Determination of Genistein, Daidzein and Glycitein in Soybean Milk by RP-HPLC Method

FLORENTINUS DIKA OCTA RISWANTO, ABDUL ROHMAN, SUWIDJIYO PRAMONO, SUDIBYO MARTONO



Therapeutic effect of Valproic acid in conjunction with physical rehabilitation in the treatment of Spinal Muscular Atrophy Type II

TAMER EMAM ELNEGAMY, HISHAM MEGAHEH, SAFY ELDIN M. ABO ALI, HANAN H. BATTESHA, MARIAN M. SHAFE



Assessment & comparison of hepatoprotective potential of indigenous therapeutic flora by using tetrachloromethane encouraged liver toxicity in Albino (Wister strain) rodent model

GAURAV KUMAR SHARMA, MEENAKSHI DHANAWAT, RAHUL LODHA, KAMAL KUMAR GOYAL, JAI KUMAR PARETA

Weapon Against Epilepsy: Acorus Calamus, It's Phytochemistry, Ethnopharmacology, And Pharmacological Actions

VIKAS SHARMA, CHANDANA MAJEE, SHIVANI SAXENA, RAJNISH KUMAR, SALAHUDDIN, AVIJIT MAZUMDER



Antimicrobial and Cytotoxic Activities of A compound Produced by An Endophytic Fungus Isolated from The Leaves of Coleus amboinicus Lour

PUJI ASTUTI, ROLLANDO ROLLANDO, DWI KOKO PRATOKO, SUBAGUS WAHYUONO, ARIEF NURROCHMAD



Effects Antihyperglycemic of Sembung (Blumea balsamifera L) Leaf Ethanol Extract on Blood Glucose and Pancreas Histopathology in Hyperglycemic Male Wistar Rat (Rattus norvegicus)

SRI WAHJUNI, NI WAYAN BOGORIANI, HAFSIAH, AHMAD FUDHOLI



The Successful treatment of acquired Severe Aplastic Anemia with Autologous Cord Blood Transplantation: case report and literature review

GHOLAMREZA BAHOUH, ZAHRA SOHEILIRAD, JAVAD BALASI

Quantification of Naproxen Sodium in biological sample by using UPLC-MS/MS method

SUMITHRA M, AYSHA JADEERA K A, YAMINI R, VIJEY AANANDHI M



A Questionnaire Based Study To Assess The Awareness And Knowledge About P Drug Concept And Rational Use Of Medicine Among Third Year Medical Students

DR. VIRENDRA KUSHWAHA, DR. POOJA AGRAWAL, DR. PUSHPENDRA PUSHKAR, DR. MANGESHKUMAR TRIPATHI, DR. SARITA SINGH



Safe Use of Ocular Nanosuspension

GNANASAMPATH MADHAN, GOWTHAMARAJAN KUPPUSWAMY



Anti-Inflammatory and Analgesic Activities of Oxadiazoles Combined with the Nucleus of Benzothiazole

VISHAL KUMAR, SATISH KUMAR SHARMA, RIZWAN AHMAD

Laparoscopic Two Stage Fowler–Stephens Orchiopexy For High Intraabdominal Undescended Testis

DR. MARYAM JABBAR GHAZI, DR. WASEEM AHMAD ELKATIB, JASSIM ABDUL HASSAN AL MAYALI, ALAA JUMA AH MANJI NASRAWI

The effect of Antibacterial Drugs on the Formation Salmonella Biofilms

EKATERINA LENCHENKO, VAN KHAI, YURY VATNIKOV



Perception of Physicians and Nurses towards Clinical Pharmacy Services (CPSs) at oncology care setting: A hospital based Observational Survey.

MANJULA GUDHOOR, MADIWALAYYA SHIVAKANTAYYA GANACHARI

A Prospective Study Of Drug Utilization Pattern Among Paediatrics And Analysing Who Prescribing Indicators In A South Indian Government District Headquarters Hospital



HAROLD PETER P L, MADHUSUDHAN S, THIRUPATHY KUMARESAN P, KEERTHI YURENIKKA J, ARUMUGAVIGNESH M, PAUL MCGRATH R

Corn Fiber Gum as a Potential Platform for the Preparation of Bioadhesive Floating Tablets of Domperidone



BHUMIKA MANGLA, ANUREKHA JAIN, DEEPINDER SINGH MALIK

Antisecretory Effect of Centella Asiatica Leaves Ethanolic Extract against Pyloric Ligation Induced Gastric Ulcers on Rats



DADANG IRFAN HUSORI, POPI PATILAYA, MARIANNE, FERA HADELINA

Clinical and biochemical evaluation of the effectiveness of therapy for hereditary motor neuronal neuropathy in children



BERDIBAEVA SAODAT ULUGBEKOVNA, MADJIDOVA YAKUTKHON NABIEVNA

Kaplan-Meier Survival Curve Analysis: Pregabalin Therapy in Patients with Central Post-Stroke Neuropathic Pain



BANGUNAWATI RAHAJENG, IWAN DWIPRAHASTO, ZULLIES IKAWATI, TRI MURTI ANDAYANI

Cost of illness of hemodialysis in Indonesia: A survey from eight hospitals in Indonesia



SUSI ARI KRISTINA, DWI ENDARTI, TRI MURTI ANDAYANI, HARDIKA ADITAMA

Potential of Endophytic Bacteria in Promote Germination of Local Aromatic Rice Seeds in Kamba Central Sulawesi, Indonesia



SRI SUDEWI, AMBO ALA, BAHARUDDIN PATANDJENGI, MUH. FARID BDR, ABDUL RAHIM SALEH, RATNAWATI RATNAWATI

Development and Evaluation of Ferulic Acid Loaded Chitosan Gel for Wound Healing

FATHIMA SAFA PA, SHONA SARA SHAJI, NAVAMIMRAJAN NAMBIAR, RAKHI RAJU, PRATIK, ANUPRIYA MAHESH

Sensory Evaluation of Nastar Cookies with Addition of Peanut (*Arachis Hypogaea* L.) and Mung Bean Flour Substitution (*Vigna Radiata* L.) as High Vegetable Protein Snack

PUTU CANDRIASIH, WERRY ASLINDA, FITRIYANI, ADHYANTI, BOHARI

Rutin trihydrate loaded liposomal gel formulation and characterization



DIVYANSHI SHARMA, SUKIRTI UPADHYAY, PRASHANT UPADHYAY

Evaluation of Incidence, Causes, and Management of Hypertension among a Sample of Iraqi Young People



ZAKARIYA AL-MASHHADANI, AMANI ANEES ABODDY, RUA ABBAS ALHAMDY, ASEEL YASSIN ALJAWARI, HADEEL YASSIN ALJAWARI

Euphorbia Milii Flower and Propolis (EMP) combination Tea Prevent Atherosclerosis Through Decreasing MMP-8 And Total Cholesterol Level but not VEGF- β in Rat with High Fat Diet (HFD)



NI MADE LINAWATI, I NYOMAN WANDE, I WAYAN RAI WIDARTA, INDIRA VIDIARI JUHANNA

The anti-migratory activity of a new curcumin analog, CCA-1.1, against T47D breast cancer cells

FEBRI WULANDARI, ROHMAD YUDI UTOMO, DHANIA NOVITASARI, MUTHI' IKAWATI, MITSUNORI KIRIHATA, JUN-YA KATO, EDY MEIYANTO



A comparative study to evaluate the pharmacotherapy of Type II Diabetes in patients visiting tertiary care teaching hospital and private clinic

KSHIRSAGAR VINAY KUMAR, DR. MAULIN MEHTA



Practice and opinion of pharmacists toward disposal of unused medicines in Indonesia

SUSI ARI KRISTINA, FIRDA RIDHAYANI, MUFTI ALIFIA RAHMADANI, NADYA PUTRI AULIYA SERAWAIDI, ACHMAD WAHYUDI



Preliminary Phytochemical And Antioxidant activity Of Leaf Extract Of Mangifera Indica

GAYATHRI R.MENON, DR R V GEETHA, DR LAKSHMI THANGAVELU



Prevalence of Chickenpox under Ten Years during the Last Five Years in Hilla City

RASHA FADHEL OBAID, RANA FADHIL OBAID, MOHAMMED MALIH RADHI, NADA KHAZAL KADHIM, SHATHA KHAZAL KADHIM



Synthesis of new tetrazole derivatives as potential antibacterial agents

AHMED WHEED RADHI, AHMED NEAMAH THAMER AL-YASIRY, ALI JABBAR RADHI

Bone Biomarkers Of Periodontal Disease

LAKSHMI PRIYA K, ANIL KUMAR K, RAJA PRIYA, JAIDEEP MAHENDRA, GEETHA ARI, SHONALI VIJAYARAJ, AMBALAVANAN NAMASIVAYAM



Profile of ethyl esters of virgin coconut oil with enfleurage of cymbopogon nardus leaves

NI MADE SUANITI, I WAYAN BANDEM ADNYANA, MANUNTUN MANURUNG, AHMAD FUDHOLI



Phylogenetic characterization based on Mitochondrial cox 1 gene analysis, antibacterial and antioxidant potential of the red algae Hypnea cornuta extracts

HAIAM, REHAM G. ELKOMY, HOSAM SALEH, MOHAMED S.M. ABD EL HAFEZ



The Effect of Giving Rice Bran Milk on Blood Glucose Levels and Body Weight in Hyperglycemic Primary School Teachers in Makassar City

SAIFUDDIN SIRAJUDDIN, MASNI, ABDUL SALAM



Post Covid 19 : Re-Define The Dining Experience

DR.NITIN GIRDHARWAL, DR.R.SRINIVASAN, DR.MRINAL VERMA, DR.SALABH MEHROTRA



Association of Crown Discolouration and Pulpal Status of Traumatized Primary Tooth in 3 to 8 year old children-A Retrospective study
NUR QISTINA BINTI AHMAD FAUZI, DEEPA GURUNATHAN

Development and evaluation of bio nanocomposite films for antifungal activity

PRASAD VINAY RAO, MEENAKSHI S, AFRASIM MOIN, NANHI NANDINI, AMIT B PATIL, SIDDARAMAIAH, NITHIN K S, D V GOWDA

Implementation of the Criminal Justice System for Persons with Disabilities

TAUFIK HIDAYAT, ACH. TAHIR, MAHRUS ALI, DENI SETYA BAGUS YUHERAWAN, ARIEF HIDAYATULLAH KHAMAINY, NYOMAN SERIKAT PUTRA JAYA, PUJIYONO

Characteristics and Antioxidant of Goat Skin Gelatin as an for Lactobacillus plantarum 1UHCC Pretreatment and Acetic Acid

HASMA HASMA, EFFENDI ABUSTAM, RATMAWATI MALAKA, MUHAMMAD IRFAN SAID, YUNY ERWANTO

Vaccination prior to initiation of anti-TNF therapy

NADA ALSALEH

The health-improving effect of a complex of daily physical activity on the cardiovascular system in people of the second mature age

S.P.EVSEEV, O.E.EVSEVA, A.V.AKSENOV, F.SCH.SALITOVA, T.YU.FEDOROVA, M.N.KOMAROV

Moral Reasoning in the Prevention of Corruption in the Implementation of Notary Law in Indonesia

IRFAN IRYADI, FX JOKO PRIYONO, BUDI SANTOSO

Criminalization of Contempt of Court arrangement in the Draft Criminal Code

SISWADI, BARDA NAWAWI ARIEF, FX DJOKO PRIYONO

Molecular Identification of Fungi causing Superficial Mycoses

SOM J.LAKHANI, SIDDHI K CHAVAN, RASHMI MAHAJAN, DEVARSHI U GAJJAR

A prospective screening of anti-inflammatory activity of mono herbal formulations of curcuma zedoria

MADAN L KAUSHIK, JAI PARKASH KADIAN, BHUPENDRA CHAUHAN, ANIRUDDH DEV SINGH

Stability of Lantana camara Linn. leaf extract cream base on the level of Fe, Mg, Zn and quercetin equivalent of flavonoid

, MAURITIUS LAMBERTUS EDY PARWANTO, DAVID TJAHYADI, HOSEA JAYA EDY, RADITYA WRATSANGKA, ASSANGGA GUYANSYAH

Policy Model for Flood Disaster Management Caused by Land Reclamation in the Waters of Palembang, Indonesia

BAMBANG EKO TURISNO, I GUSTI AYU GANGGA SANTI DEWI, SITI MAHMUDAH, AMIEK SOEMARMI

Strategies and Legal Protection for Undocumented Indonesian Migrant Workers

ELFIA FARIDA, RAHAYU, FX ADJI SAMEKTO

Research Article

Stability of *Lantana camara* Linn. leaf extract cream base on the level of Fe, Mg, Zn and quercetin equivalent of flavonoid

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ABSTRACT

Lantana camara Linn. live as a wild plant. These plants can be used as a natural medicine ingredient. The leaves of these plants can be extracted and used as a cream component. Effectiveness of *L. camara* Linn. leaf extract cream influenced by various factors, including levels of active substances. Content of the active substance in the *L. camara* Linn. leaf extract cream affected by temperature and storage time. The temperature and storage time will affect the content of the active substance so that it affects the effectiveness of *L. camara* Linn. leaf extract cream. Aims of this study to determine changes in levels of Fe, Mg, Zn and flavonoids in *L. camara* Linn. leaf extract cream. *L. camara* Linn. leaf extract cream were used in this study are 3%, 4% and 5%, while the storage time used was 0 and 180 days. Storage of *L. camara* Linn. leaf extract cream at 45 °C. *L. camara* Linn. leaf extract cream has a semi-solid form, has a distinctive smell like extracts and colored like the leaf extract of *L. camara* Linn. The cream base at storage day 0 (H0) and day 180 (H180) had a pH of 6, while the *L. camara* Linn. leaf extract cream 3%, 4% and 5% have a pH value of 5. Cream base and *L. camara* Linn. leaf extract cream 3%, 4% and 5% homogeneous and not clumping. There is a difference in the dispersibility between the cream base and the *L. camara* Linn. leaf extract cream 3%, 4% and 5%. There were changes in levels of Fe and Zn in the *L. camara* Linn. leaf extract cream 3%, 4% and 5% for 180 days of storage. Levels of Mg in *L. camara* Linn. leaf extract cream 3%, 4% and 5% remain unchanged for 180 days of storage. After storage for 180 days, the levels of quercetin equivalent of flavonoid were the most stable in the type of *L. camara* Linn. leaf extract cream 4%, while the less stable was *L. camara* Linn. leaf extract cream 3%, and the most unstable was *L. camara* Linn. leaf extract cream 5%.

Keywords: *L. camara* Linn. leaf extract cream, Fe, Mg, Zn, flavonoid, quercetin.

INTRODUCTION

"Natural-medicine" deserves to be a source of active ingredients that are useful in therapeutics. Based on the source, natural-medicine is grouped into 2 groups, namely animal natural-medicine and vegetable natural-medicine. Worm powder is an example of animal natural-medicine, while the leaf extract of *Lantana camara* Linn. is an example of vegetable natural-medicine. We have researched one of the animal natural-medicine, namely earthworm powder. The results of our previous study showed the fractionation and characterization of proteins contained in worm powder (Parwanto et al., 2016). On the other hand, we also studied of *L. camara* Linn. and *Tagetes erecta* Linn. as a vegetable natural-medicine. *L. camara* Linn. leaf extract we

formulated it in the form of an ointment (Parwanto et al., 2013), then we tested its ability on rat dermal wound healing (Parwanto, 2017). We have also tested the effectiveness of *T. erecta* Linn. leaf extract cream on rat dermal wound healing (Parwanto et al., 2020). Moreover, *T. erecta* Linn. has been formulated as a gel, cream, anti-mosquito lotion and hair dye (Edy & Parwanto, 2019).

L. camara Linn. is a wild plant. In the taxonomy of higher plants, *L. camara* Linn. including the familia of Verbenaceae. A previous studies have shown the chemical composition of all parts of the plant body of *L. camara* Linn. and its pharmacological activity (Kalita et al., 2012). Phytochemical composition of *L. camara* Linn. includes carbohydrates, essential oils, proteins,

alkaloids, phenols, flavonoids, glycosides, iridoid glycosides, phenyl ethanoids, oligosaccharides, quinins, saponins, steroids, triterpenes, sesquiterpenoids and tannins as the main components (Bhakta & Ganjewala 2009, Venkatachalam et al., 2011, Musyimi et al., 2017). The results of other studies showed that the leaf extract of *L. camara* Linn. contains alkaloids, flavonoids, tannins and triterpenoids (Murugesan et al., 2016).

L. camara Linn. extract known to cure several diseases and is used in various medicinal preparations. A previous studies showed that *L. camara* Linn. extract has anti-bacterial effects of *Escherichia coli* (Ganjewala et al., 2009; Edy & Parwanto, 2020), *Bacillus subtilis* (Ganjewala et al., 2009), *Pseudomonas aeruginosa* (Ganjewala et al., 2009; Shah et al., 2018) and low activity against *Staphylococcus aureus* (Ganjewala et al., 2009); Shah et al., 2018), *Proteus vulgaris* (Barreto et al., 2010), *Bacillus cereus* and *Salmonella typhi* (Badakhshan et al., 2009). Apart from its anti-bacterial effect, *L. camara* Linn. contains bioactive components which have an anti-fungal effect against *Colletotrichum gloeosporioides* Penz. (Bashir et al., 2019). It is also stated that *L. camara* Linn. has the ability as anti-ulcerogenic (Thamotharan et al., 2010). *L. camara* Linn. extract have activities for wound healing. Topical administration at a dose of 100 mg/kg/day increases wound contraction, collagen synthesis and reduces wound healing time (Nayak et al., 2009).

A previous studies showed the characteristic of *L. camara* Linn. leaf extract ointment, including organoleptic, homogeneity and pH test (Parwanto et al., 2013). There is research on *L. camara* Linn. leaf extract ointment which has effect on rat dermal wound healing that infected by *Staphylococcus epidermidis*. In this study, the effectiveness of *L. camara* Linn. leaf extract ointments 5% and 10% was tested in against wound healing (Parwanto, 2017). The quality of wound healing, the number of bacteria, the content of DNA and proteins in the injured tissue were compared to determine the effectiveness of *L. camara* Linn. leaf extract ointments 5% and 10%. The results of these studies indicated that *L. camara* Linn. leaf extract ointment 5% more effective than the *L. camara* Linn. leaf extract ointment 10% in rat dermal wound healing that infected by *S. epidermidis* (Parwanto, 2017). Therefore, it is necessary to continue investigated efficacy of *L. camara* Linn. leaf extract ointment in human dermal wound healing.

In addition with *L. camara* Linn. leaf extract ointment, it is also known the effect of *L.*

camara Linn. leaf extract cream on rat dermal wound healing. One thing to note that the stability of *L. camara* Linn. leaf extract cream has not been known for its stability when stored for a certain period of time. Need to be considered, namely the stability of *L. camara* Linn. leaf extract cream if stored for a period of time. Therefore, it is necessary to study the stability of *L. camara* Linn. leaf extract cream at a certain storage time. The parameters used included levels of Fe, Mg, Zn, quercetin equivalent flavonoids, storage time and temperature of *L. camara* Linn. leaf extract cream. Determination of the cream stability of *L. camara* Linn. leaf extract this is carried out on certain characteristics including organoleptic, dispersibility and pH.

MATERIALS AND METHODS

Study area

This research includes the plant collection of *L. camara* Linn., plant identification, leaf extract preparation, cream formulation, organoleptic test, pH measurement, homogeneity test, dispersibility test, measurement of Fe, Mg, Zn and flavonoids. This research was conducted from June 2017-November 2018. Leaf extraction of *L. camara* Linn. conducted at the Pharmacy Laboratory, Faculty of Math and Natural Sciences, Universitas Sam Ratulangi, Indonesia. Formulation of *L. camara* Linn. leaf extract cream conducted at the Biomedical Laboratory, Faculty of Medicine, Universitas Trisakti, Indonesia. Standardization of *L. camara* Linn. leaf extract cream includes organoleptic test, pH test, homogeneity test, dispersibility test, determination of Fe, Mg, Zn and flavonoids. Organoleptic test, pH measurement, homogeneity test and dispersibility test of *L. camara* Linn. leaf extract cream conducted at the Biomedical Laboratory, Faculty of Medicine, Universitas Trisakti, Indonesia. Measurement of Fe, Mg, Zn and flavonoids equivalent quercetin in *L. camara* Linn. leaf extract cream conducted at the Laboratorium Penelitian dan Pengujian Terpadu (LPPT), Universitas Gajah Mada, Indonesia.

Collection of *L. camara* Linn.

L. camara Linn. which we use as an extract ingredient, grows wild at the hills of Cino Mati, Pleret district, Bantul regency, Special Region of Yogyakarta, Indonesia. The area is better known by the surrounding community as Tanjakan Cino Mati (Fig. 1). Environemnt of *L. camara* Linn. as a wild plants (Fig. 2), while habitus of *L. camara* Linn. (Fig. 3). Collection of *L. camara* Linn. leaf conducted on June 19th 2017. At that time, the area was at the end of the rainy season or the beginning of the dry season.

Extraction of *L. camara* Linn. leaf

Leaves of *L. camara* Linn. washed with running water, then dried in the sun to dry with a black cloth cover. Leaves of *L. camara* Linn. which was dry was made powder, then extracted with 96% ethanol. The viscous of *L. camara* Linn. leaf extract than stored in a closed bottle in the refrigerator. *L. camara* Linn. leaf extract ready to be used as an active substance in cream formulations.

Formulation of *L. camara* Linn. leaf extract cream

Cream base contains 16 grams of stearic acid, 2 grams of cetyl alcohol, 10 mL of liquid paraffin, 0.2 grams of methyl paraben, 7 drops of triethanolamine, 8.5 mL of glycerol, added to 100 grams of aquadest. Cream making process was done by mixing stearic acid, cetil alcohol and liquid paraffin put into a porcelain cup 1, while other substances are put into the porcelain cup 2. The ingredients in the two porcelain cups are heated at 70 °C so that they are completely melted without stirring. The next step, the two ingredients in each cup are put into 1 container, namely hot mortar. The mixing of the two ingredients (cream base homogenization) is carried out in a hot mortar, while stirring rapidly using a hot stamp. The addition of 70 ° C aquabidestilata needs to be done slowly while stirring continuously until a good cream base is formed, then cooled at room temperature.

The addition of *L. camara* Linn. leaf extract to the cream base was carried out according to the formula (3%, 4% and 5%). The mixing process of *L. camara* Linn. leaf extract with a cream base needs to be stirred until homogeneous.

Organoleptic test, pH measurement, homogeneity and dispersibility test

Organoleptic tests that are carried out include shape, smell and color of the cream preparation. The measurement of pH value was done using a universal pH stick. Universal pH stick is dipped in to 0.5 grams of cream that has been diluted with 5 mL of aquadest. Homogeneity test was carried out by observing the spread of *L. camara* Linn. leaf extract cream on a glass plate. The tested cream was taken from three places, namely the top, middle and bottom of the cream container. The dispersibility test was carried out by placing 0.5 grams of cream between two transparent glass plates which were given a load of 50 grams, then added to 100 grams. Measurement of the diameter of the dispersibility of the cream was carried out after the cream had not spread again or approximately 1 minute after given load.

Measurement levels of Fe, Mg, Zn and quercetin equivalent of flavonoid

Standardization of *L. camara* Linn. leaf extract cream in this study included levels of Fe, Mg, Zn and quercetin equivalent of flavonoid. Measurement of substance levels has been done using Atomic Absorption Spectrometer (AAS). A calibration curve is created in advance as a reference to calculate the content of the substance to be measured. Measurement levels of Fe, Mg, Zn and quercetin equivalent of flavonoid were carried out on day 0 and day 180. Storage of *L. camara* Linn. leaf extract cream carried out at 45 °C and 75% relative humidity (RH) for 180 days. Changes in levels of Fe, Mg, Zn and quercetin equivalent of flavonoid were used to determine the stability of *L. camara* Linn. leaf extract cream. *L. camara* Linn. leaf extract cream was declared stable if changes in levels of Fe, Mg, Zn and quercetin equivalent of flavonoid during storage <10%.

Statistic analysis

The difference in the dispersibility of the cream, levels of Fe, Mg, Zn and flavonoids between groups tested with One Way Anova. If the test results show differences between groups, then continued with the Least Significant Difference (LSD) test. The test results are different if the P value <0.05.

RESULTS

Composition of *L. camara* Linn. leaf extract cream

Composition of *L. camara* Linn. leaf extract cream 3%, 4% and 5% are presented in Table 1. Preparation of *L. camara* Linn. leaf extract cream 3%, 4% and 5% are presented in Figure 4.

Organoleptic on cream base and *L. camara* Linn. leaf extract cream.

The results of organoleptic test on cream base and *L. camara* Linn. leaf extract cream are presented in Table 2. A good cream, among others, has parameters such as: semi solid form, has a distinctive smell like extracts and colored like the leaf extract of *L. camara* Linn.

pH on cream base and *L. camara* Linn. leaf extract cream.

The results of pH measurements on cream base and *L. camara* Linn. leaf extract cream are presented in Table 3. pH value of *L. camara* Linn. leaf extract cream the above is still good because it is in the pH value range 4.5-6.5, which corresponds to the pH value of human skin.

Homogeneity on cream base and *L. camara* Linn. leaf extract cream.

Homogeneity test results on cream base and *L. camara* Linn. leaf extract cream are presented in Table 4. A homogeneous cream is characterized by the absence of lumps on the result of basting on the glass plate, flat structure and has a uniform color from the starting point of basting to the end point of basting. *L. camara* Linn. leaf extract cream 3%, 4% and 5% mentioned above are homogeneous.

Dispersibility on cream base and *L. camara* Linn. leaf extract cream.

Dispersibility test results on cream base and *L. camara* Linn. leaf extract cream are presented in Table 5. Based on the results of the dispersibility test above, the base cream fulfills the requirements for topical preparations because it has a dispersibility of 5-7 cm. *L. camara* Linn. leaf extract cream 3%, 4% and 5% both at 0 and 180 days of measurement did not meet the good power requirements for topical preparations because the dispersibility was less than 5 cm.

Levels of Fe, Mg and Zn in *L. camara* Linn. leaf extract cream

The calibration curve was used to determine the levels of Fe, Mg and Zn in *L. camara* Linn. leaf extract cream are presented in Figure 5. Levels of Fe, Mg and Zn in *L. camara* Linn. leaf extract cream are presented in Table 6.

Levels of Fe in *L. camara* Linn. leaf extract cream 3% and 5% between day 0 compared with day 180 ($[Fe] \Delta_{h0-h180}$) did not change significantly. Changes in Fe levels at both doses of the cream <10%. Levels of Fe in *L. camara* Linn. leaf extract cream 4% on day 0 compared with day 180 had a significant change, because ($[Fe] \Delta_{h0-h180}$) >10%. Levels of Mg in the *L. camara* Linn. leaf extract cream 3%, 4% and 5% between day 0 compared with day 180 ($[Mg] \Delta_{h0-h180}$) did not change significantly. Changes in Mg levels at both doses of the cream <10%. Levels of Zn in *L. camara* Linn. leaf extract cream 3% and 4% between day 0 compared with day 180 ($[Zn] \Delta_{h0-h180}$) did not change significantly. Changes in Zn levels at both doses of the cream <10%. On the other hand, the levels of Zn in *L. camara* Linn. leaf extract cream 5% increased by 14.48%. Due increase levels of Zn in the cream >10%, therefore *L. camara* Linn. leaf extract cream 5% is unstable.

Levels of flavonoid in *L. camara* Linn. leaf extract cream.

Quercetin is used as the standard to determine the level of total flavonoids in the cream. Total flavonoid expressed as weight of quercetin equivalent at 100 mg *L. camara* Linn. leaf extract cream. Calculations for total flavonoids have been carried out using the equation below.

$$\text{Total flavonoid (\%w/w)} = \frac{\text{Quercetin concentration (ppm)} \times \text{Volume in the solution (mL)}}{\text{Mass of cream (grams)}} \div 1000$$

The calibration curve was used to determine levels of quercetin equivalent of flavonoid in *L. camara* Linn. leaf extract cream are presented in Figure 6. The levels of quercetin equivalent of flavonoid in *L. camara* Linn. leaf extract cream are presented in Table 7. Changes in the levels of quercetin equivalent of flavonoid in *L. camara* Linn. leaf extract cream are presented in Figure 7. Based on changes in the levels of quercetin equivalent flavonoid, *L. camara* Linn. leaf extract cream 3% is unstable when stored at 45 °C with 75% relative humidity (RH) for 180 days. This is because there was an increase in the levels of quercetin equivalent flavonoid in *L. camara* Linn. leaf extract cream 3% more than 10% (+13.54%). *L. camara* Linn. leaf extract cream 5% is also unstable when stored at 45 °C with 75% relative humidity (RH) for 180 days. This is because there was an increase in the levels of quercetin equivalent flavonoid in *L. camara* Linn. leaf extract cream 5% more than 10% (+124.71%). On the

other hand, *L. camara* Linn. leaf extract cream 4% is stable when stored at 45 °C with 75% relative humidity (RH) for 180 days. This is because there was an increase in the levels of quercetin equivalent flavonoid in *L. camara* Linn. leaf extract cream 4% less than 10% (+7.54%).

DISCUSSION

The cream base used in this study was semi-solid, odorless and colorless. The cream base components we use are the same as previous studies (Deepika P and Singh RK, 2017). Storage time for 180 days does not change the shape, smell and color of the cream base. After the cream base was mixed with *L. camara* Linn leaf extract. so that it forms a cream, then the cream remains semi-solid, with a distinctive smell of *L. camara* Linn leaf extract. and slightly blackish green. Mixture of *L. camara* Linn. leaf extract into the cream base, does not change shape, but smell and color change. *L. camara* Linn. leaf

extract cream 3%, 4% and 5% are semi-solid, with a distinctive smell of *L. camara* Linn. leaf extract and slightly blackish green. It has been shown that organoleptic test on cream base and *L. camara* Linn. leaf extract cream 3%, 4% and 5% at 0 months and 180 days of storage showed the same results. Therefore, the storage time of 180 days does not change shape, smell or color on a cream base and *L. camara* Linn. leaf extract cream 3%, 4% and 5%. Based on the results of the organoleptic test in this study, it can also be stated that the addition of *L. camara* Linn. leaf extract had no significant effect on the organoleptic properties of the cream base. A previous studies, we also used the same guidelines to test the organoleptic of *L. camara* Linn. leaf extract cream (Mahardhitya & Parwanto, 2018).

In this study, it was proven that there was a difference in pH between the cream base and *L. camara* Linn. leaf extract cream. 3%, 4% and 5%. The cream base we use has a pH value of 6, while the *L. camara* Linn. leaf extract cream 3%, 4% and 5% have a pH value of 5. This means that the addition of *L. camara* Linn. leaf extract reduces the pH value of the cream base. The pH value of *L. camara* Linn. leaf extract cream 3%, 4% and 5% are still good, because they are in pH range 4.5-6.5 which corresponds to the pH value of human skin. Hence, the *L. camara* Linn. leaf extract cream 3%, 4% and 5% still meets the parameters of pH value required for human skin health. Hence, *L. camara* Linn. leaf extract cream 3%, 4% and 5% still meets the pH value parameter for human skin health. Hence, *L. camara* Linn. leaf extract cream 3%, 4% and 5% still meets the requirements of the pH value for human skin health. We have also used these guidelines in the preparation of *L. camara* Linn. leaf extract ointment (Parwanto et al., 2013, 2017, 2020). The results of other studies showed that *Muntingia calabura* leaf extract cream had a pH of 4.8-4.9. The pH value of the cream is also still in accordance with the pH of human skin (Sekar and Jalil, 2017). In addition, raspberry and grape seed extract cream 2% has a pH of 5.8-6.9 (Kawarkhe et al., 2017).

There are 3 characteristics of a homogeneous cream preparation, namely there are no lumps in the results of basting on the glass plate, flat structure and uniform color from the starting point of basting to the end point of basting. Preparations of a cream base and *L. camara* Linn. leaf extract cream 3%, 4%, 5% in this study showed homogeneous and not clot. The homogeneity of the cream base (as negative control) did not change over 180 days of storage, as well as *L. camara* Linn. leaf extract cream 3%, 4%, 5%. Homogeneity of cream in this study in

accordance with several previous research results. In detail, it shows that the *Solanum torvum* fruit extract cream 0.5%, 1% and 2% has a homogeneous formulation (Wibowo et al., 2017). In addition, it was also shown that storage at low temperature, room temperature and high temperature did not change the homogeneity of azelaic acid cream (Apriani et al., 2018).

The dispersibility requirements for topical preparations are 5-7 cm (Grag et al., 2002; Rachmalia et al., 2016). The cream base in this study fulfilled the requirements for topical preparations because the dispersibility on day 0 was 5.26 ± 0.51 cm, while the dispersibility after storage for 180 days was 5.13 ± 0.55 cm. On the other hand, *L. camara* Linn. leaf extract cream 3%, 4% and 5% both on day 0 and after storage for 180 days did not meet the good dispersibility requirements for topical preparations, because the dispersibility was less than 5 cm. However, the cream can be used as a topical preparation although it can cause discomfort on the skin. The results of the dispersibility test for cream in this study were different compared with the cream of *S. torvum* Swartz. fruit extract (Wibowo et al., 2017). We suspect that these differences are due to differences in cream composition. The results of other studies showed that the active ingredient content of raspberry or grape seed extract or a combination of 2% in the cream base did not change the dispersibility. In detail, it can be seen that the dispersibility of raspberry seed extract cream were 32.6 ± 0.55 cm/second, grape seed extract cream were 31.21 ± 0.93 cm/second, the combination of raspberry seed and grape seed extract were 27.96 ± 0.40 cm/second (Kawarkhe et al., 2017). It should be noted that the results of this study are very different compared with our results.

Fe has a function as an enzyme component. Cytochromes are an example of an enzyme that requires Fe. In plants, including *L. camara* Linn., Fe is involved in the synthesis of chlorophyll. In addition, Fe is also very important for the maintenance of the structure and function of chlorophyll. Levels of Fe in plants are influenced by several factors, including gene activity factors (ferritin gene, nicotianamine synthase gene, and Fe^{+2} -nicotianamine transporter gene), iron biofortification factors and iron-absorption factors from the soil (Rout and Sahoo, 2015). In this study, we did not measure the levels of Fe in *L. camara* Linn. leaves as an extract material, but we did measure the levels of Fe contained in *L. camara* Linn. leaf extract cream. The data in this study showed that the levels of Fe in *L. camara* Linn. leaf extract cream 3% and 5% after storage for 180 days, did not change, because $\Delta_{h0-h180}$

<10%. Levels of Fe in the *L. camara* Linn. leaf extract cream 3% during storage increased by 6.65%, whereas in *L. camara* Linn. leaf extract cream 5% was 5.69%. Levels of Fe in *L. camara* Linn. leaf extract cream 4% after storage for 180 days increased significantly, because $([Fe]_{h0-h180}) > 10\%$. Levels of Fe in the *L. camara* Linn. leaf extract cream 4% during storage increased by 10.29% (see Table 6). The results of this study still need to be continued in order to explain the changes in the levels of Fe in *L. camara* Linn. leaf extract cream. 4%.

Mg in plants is present as the central atom of the chlorophyll molecule in the chloroplast complex. Therefore, Mg contributes to the absorption of light during photosynthesis (Gerendás & Führes, 2013). In this study, we did not measure the levels of Mg in *L. camara* Linn. leaves as an extract material, but we did measure the levels of Mg contained in *L. camara* Linn. leaf extract cream. The data in this study showed that the levels of Mg in *L. camara* Linn. leaf extract cream 3%, 4% and 5% after storage for 180 days, did not change, because $\Delta_{h0-h180} < 10\%$ (see Table 6). Data on the levels stability of Mg in *L. camara* Linn. leaf extract cream in this study can be used as a basis to develop cream stability. This is in accordance with the results of previous studies which shows the role of Mg in emulsion stability (Zhu et al., 2017).

Zn is a component of protein building blocks in plants. Beside that, Zn is required as a component of the enzyme oxidoreductases, transferases, hydrolases, lyases, isomerases, ligases (Broadley et al., 2007). A previous studies indicated that zinc sulfate was added to the cream has strong synergistic anti-bacterial activity (Chen et al., 2016). In this study, we did not measure the levels of Zn in *L. camara* Linn. leaves as an extract material, but we did measure the levels of Zn contained in *L. camara* Linn. leaf extract cream. The data in this study showed that the levels of Zn in *L. camara* Linn. leaf extract cream 3% and 4% after storage for 180 days, did not change, because $\Delta_{h0-h180} < 10\%$. Levels of Zn in the *L. camara* Linn. leaf extract cream 3% during storage increased by 6.06%, whereas in *L. camara* Linn. leaf extract cream 4% was 8.86%. Levels of Fe in *L. camara* Linn. leaf extract cream 5% after storage for 180 days increased significantly, because $([Fe]_{h0-h180}) > 10\%$. Levels of Fe in the *L. camara* Linn. leaf extract cream 5% during storage increased by 14.48% (see Table 6). Zn in combination with oxygen thus forming zinc oxide has been applied as a component of a cream for therapeutic applications. More detail, has been stated that the active ingredient of the cream can be added to a cream base containing

20% zinc oxide, for topical preparations on human skin (Akes & Cournoyer, 2003).

In this study, the levels of quercetin equivalent of flavonoid in the *L. camara* Linn. leaf extract cream 4% before storage was higher compared with *L. camara* Linn. leaf extract cream 3% and 5%. Although quercetin equivalent of flavonoid in the *L. camara* Linn. leaf extract cream 4% before storage was higher compared with *L. camara* Linn. leaf extract cream 3% and 5%, but after being stored for 180 days, change in levels of flavonoids in these cream is very high. A previous study showed that levels of flavonoids in the *L. camara* Linn. leaf extract was $63,767 \pm 1.20$ mg routine equivalents per gram of extract (El-Sayed et al., 2017). Levels of flavonoids in *L. camara* Linn. need to be the focus of research, because it has an effect on human health. A previous studies showed effects of flavonoids as anti-psoriatic (Saelee et al., 2011), anti-viral, anti-bacterial, anti-carcinogenic and anti-inflammatory (Materska, 2008). It has been stated that flavonoids are shown to have anti-oxidative activity, free radical scavenging capacity, coronary heart disease prevention, hepatoprotective, anti-inflammatory, and anti-cancer activities, while some flavonoids exhibit potential anti-viral activities. For pharmaceuticals, flavonoids have been used in microbial biotechnology (Kumar & Pandey, 2013). The results of this study showed similar results with previous studies. The results of previous studies showed changes in levels of flavonoids in the *L. camara* Linn. leaf extract cream 3%, 4% and 5% after being stored for 1 year. Changes in levels of flavonoids in the *L. camara* Linn. leaf extract cream 3%, 4% and 5% after being stored for 1 year, respectively +85.6%, -1.07% and +54.7% ($P=0.001$) (Mahardhitya & Parwanto, 2018).

CONCLUSION

The cream of *L. camara* Linn. leaf extract cream is semi-solid, the peculiar smell of the extract used and colored like the leaf extract of *L. camara* Linn. *L. camara* Linn. leaf extract cream 3%, 4% and 5% before and after storage for 180 days, the pH proved unchanged, which is 5. *L. camara* Linn. leaf extract cream 3%, 4% and 5% are homogeneous with the characteristics of the absence of lumps, flat structure and has a uniform color. Dispersibility of *L. camara* Linn. leaf extract cream 3%, 4% and 5% before and after storage for 180 days <5 cm. However, the cream can be used as a topical preparation although it can cause discomfort on the skin. There was a change in levels of Fe and Zn in the *L. camara* Linn. leaf extract cream 3%, 4% and 5% after storage for 180 days, but the level of Mg did not change. The

levels of quercetin equivalent of flavonoid in the *L. camara* Linn. leaf extract cream 4% was higher compared with *L. camara* Linn. leaf extract cream 3% and 5%. After storage for 180 days, changes in the levels of quercetin equivalent of flavonoids in *L. camara* Linn. leaf extract cream 4% proved to be the highest compared with *L. camara* Linn. cream leaf extract cream 3 and 5%.

SIGNIFICANCE STATEMENT

Based on changes in levels of quercetin equivalent of flavonoid, this study found that *L. camara* Linn. leaf extract cream 4% was the most stable compared with *L. camara* Linn. leaf extract cream 3 and 5%. This fact can be used as a reference to continue the clinical trial of *L. camara* Linn. leaf extract cream 3%, 4% and 5% for human dermal wound healing.

AUTHOR'S CONTRIBUTIONS

MLEP, DT and AG: Schemed and designed experiment. MLEP, HJE, and RW: Collecting and interpretation of the results. All authors analyzed the data and wrote the manuscript. All authors read and approved the final manuscript.

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Table 1. Composition of *L. camara* Linn. leaf extract cream.

Components	<i>L. camara</i> Linn. leaf extract cream 3%	<i>L. camara</i> Linn. leaf extract cream 4%	<i>L. camara</i> Linn. leaf extract cream 5%
Oil phase			
Stearic acid	16 g	16 g	16 g
Cetyl alcohol	2 g	2 g	2 g
Liquid paraffin	10 mL	10 mL	10 mL
Water phase			
Methyl paraben	0,2 g	0,2 g	0,2 g
Triethanolamine	7 drops	7 drops	7 drops
Glycerol	8,5 mL	8,5 mL	8,5 mL
<i>L. camara</i> Linn. leaf extract	3 g	4 g	5 g
Aquabidest Added up to	100 g	100 g	100 g

Abbreviation: g=gram; mL=milli-liter.

Table 2. The results of organoleptic test on cream base and *L. camara* Linn. leaf extract cream.

Type of cream	Shape		Smell		Color	
	H 0	H 180	H 0	H 180	H 0	H 180
Cream base	half solid	half solid	-	-	Yellowish white	Yellowish white
<i>L. camara</i> Linn. leaf extract cream 3%	half solid	half solid	+	+	Green slightly blackish	Green slightly blackish
<i>L. camara</i> Linn. leaf extract cream 4%	half solid	half solid	+	+	Green slightly blackish	Green slightly blackish
<i>L. camara</i> Linn. leaf extract cream 5%	half solid	half solid	+	+	Green slightly blackish	Green slightly blackish

Abbreviation: +=the distinctive smell of *L. camara* Linn. leaf extract; H=observation day.

Table 3. The results of pH measurements on cream base and *L. camara* Linn. leaf extract cream.

Sample	pH of base cream		pH of <i>L. camara</i> Linn. leaf extract cream 3%		pH of <i>L. camara</i> Linn. leaf extract cream 4%		pH of <i>L. camara</i> Linn. leaf extract cream 5%	
	H 0	H 180	H 0	H 180	H 0	H 180	H 0	H 180
R1	6	6	5	5	5	5	5	5
R2	6	6	5	5	5	5	5	5
R3	6	6	5	5	5	5	5	5
R4	6	6	5	5	5	5	5	5
R5	6	6	5	5	5	5	5	5
R6	6	6	5	5	5	5	5	5
Mean	6	6	5	5	5	5	5	5

Abbreviation: R= replicant; H=observation day.

Table 4. Homogeneity test results on cream base and *L. camara* Linn. leaf extract cream.

Sample	Cream base		<i>L. camara</i> Linn. leaf extract cream 3%		<i>L. camara</i> Linn. leaf extract cream 4%		<i>L. camara</i> Linn. leaf extract cream 5%	
	H 0	H 180	H 0	H 180	H 0	H 180	H 0	H 180
R1	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc
R2	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc
R3	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc
R4	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc
R5	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc
R6	hnc	hnc	hnc	hnc	Hnc	hnc	hnc	hnc

Abbreviation: R= replicant; H=observation day; hnc=homogeneous and not clot.

Tabel 5. Dispersibility test results on cream base and *L. camara* Linn. leaf extract cream.

Sample	Dispersibility (cm)							
	Cream base		<i>L. camara</i> Linn. leaf extract cream 3%		<i>L. camara</i> Linn. leaf extract cream 4%		<i>L. camara</i> Linn. leaf extract cream 5%	
	H 0	H 180	H 0	H 180	H 0	H 180	H 0	H 180
R1								
0 gram	4.6	4.5	2.6	2.2	2.4	2.2	2.4	2.3
50 gram	5.2	5.1	3.2	2.8	3.1	2.7	3.2	2.8
100 gram	5.9	5.8	3.8	3.2	3.9	3.1	3.9	3.3
R2								
0 gram	4.7	4.4	2.5	2.1	2.4	2.2	2.4	2.3
50 gram	5.3	5.1	3.1	2.9	3.1	2.7	3.2	2.8
100 gram	5.8	5.6	3.9	3.3	3.9	3.1	3.9	3.3
R3								
0 gram	4.6	4.5	2.6	2.1	2.4	2.2	2.4	2.3
50 gram	5.3	5.2	3.1	2.8	3.1	2.7	3.2	2.8
100 gram	5.8	5.9	3.8	3.3	3.9	3.1	3.9	3.3
R4								
0 gram	4.6	4.5	2.7	2.1	2.4	2.2	2.4	2.3
50 gram	5.3	5.1	3.1	2.9	3.1	2.7	3.2	2.8
100 gram	5.9	5.7	3.9	3.3	3.9	3.1	3.9	3.3
R5								
0 gram	4.7	4.5	2.6	2.1	2.4	2.2	2.4	2.3
50 gram	5.3	5.2	3.2	2.9	3.1	2.7	3.2	2.8
100 gram	5.8	5.8	3.6	3.2	3.9	3.1	3.9	3.3
R6								
0 gram	4.6	4.4	2.5	2.2	2.4	2.2	2.4	2.3
50 gram	5.4	5.3	3.3	2.8	3.1	2.7	3.2	2.8
100 gram	5.8	5.8	3.9	3.3	3.9	3.1	3.9	3.3
Mean	5.26	5.13	3.19	2.75	3.13	2.67	3.17	2.80
SD	0.51	0.55	0.53	0.48	0.63	0.38	0.63	0.42

Abbreviation: R= replicant; H=observation day; cm=centimeter; SD=standard od deviation

Table 6. Levels of Fe, Mg and Zn in *L. camara* Linn. leaf extract cream

Sample	<i>L. camara</i> Linn. leaf extract cream 3%		<i>L. camara</i> Linn. leaf extract cream 4%		<i>L. camara</i> Linn. leaf extract cream 5%	
	H 0	H 180	H 0	H 180	H 0	H 180
Day observation						
Fe (mg/Kg)						
R1	18.78	17.38	10.07	12.28	8.51	9.04
R2	16.94	21.22	11.54	11.93	8.67	9.66
R3	17.72	21.55	11.24	12.65	7.98	8.56
R4	18.12	22.17	10.99	11.95	8.86	8.91
R5	20.43	21.47	11.16	11.89	8.65	9.46
R6	21.67	17.42	11.89	12.16	8.99	8.97
Mean	18.94	20.20	11.15	12.14	8.61	9.10
$\Delta_{h0-h180}$ (%)	6.65		10.29		5.69	
Mg (mg/Kg)						
R1	148.13	158.89	249.57	261.54	341.29	356.45
R2	146.72	156.23	244.78	257.39	336.73	358.54
R3	144.97	157.34	254.36	259.21	346.86	352.68
R4	152.24	152.77	253.72	260.12	345.52	359.67
R5	151.56	158.67	247.56	252.57	342.87	359.26
R6	150.82	154.62	246.91	260.76	343.18	360.31
Mean	149.07	156.42	249.48	258.60	343.18	358.09
$\Delta_{h0-h180}$ (%)	4.51		3.65		4.34	
Zn (mg/Kg)						
R1	13.38	13.84	19.69	22.76	5.12	5.79
R2	10.87	12.07	20.54	22.43	4.78	5.21
R3	11.75	12.69	18.96	22.21	5.13	5.98
R4	12.45	12.95	19.92	22.91	4.85	5.42
R5	13.15	13.94	21.65	21.79	4.96	5.73
R6	12.64	13.21	21.09	20.57	4.58	5.51
Mean	12.37	13.12	20.31	22.11	4.90	5.61
$\Delta_{h0-h180}$ (%)	6.06		8.86		14.48	

Abbreviation: R=replicant; H=observation day; $\Delta_{h0-h180}$ =difference in measurement levels between day 0 compared with day 180; %=percent.

Table 7. The levels of quercetin equivalent of flavonoid in *L. camara* Linn. leaf extract cream

Sample	Quercetin equivalent of flavonoid (mg/100 gram cream)					
	<i>L. camara</i> Linn. leaf extract cream 3%		<i>L. camara</i> Linn. leaf extract cream 4%		<i>L. camara</i> Linn. leaf extract cream 5%	
	H 0	H 180	H 0	H 180	H 0	H 180
R1	32.35	32.66	96.86	89.76	67.94	153.87
R2	29.81	35.87	98.78	92.67	67.74	155.38
R3	28.97	34.89	99.35	92.99	68.91	153.56
R4	29.65	36.65	98.76	92.76	69.43	152.74
R5	30.21	33.84	99.24	92.89	69.78	154.68
R6	32.89	34.87	97.99	91.97	67.78	155.21
Mean	30.65	34.80	98.50	92.17	68.60	154.15
SD	1.59	1.42	0.93	1.24	0.90	1.12

Abbreviation: R=replicant; H=observation day; SD=standard of deviation.

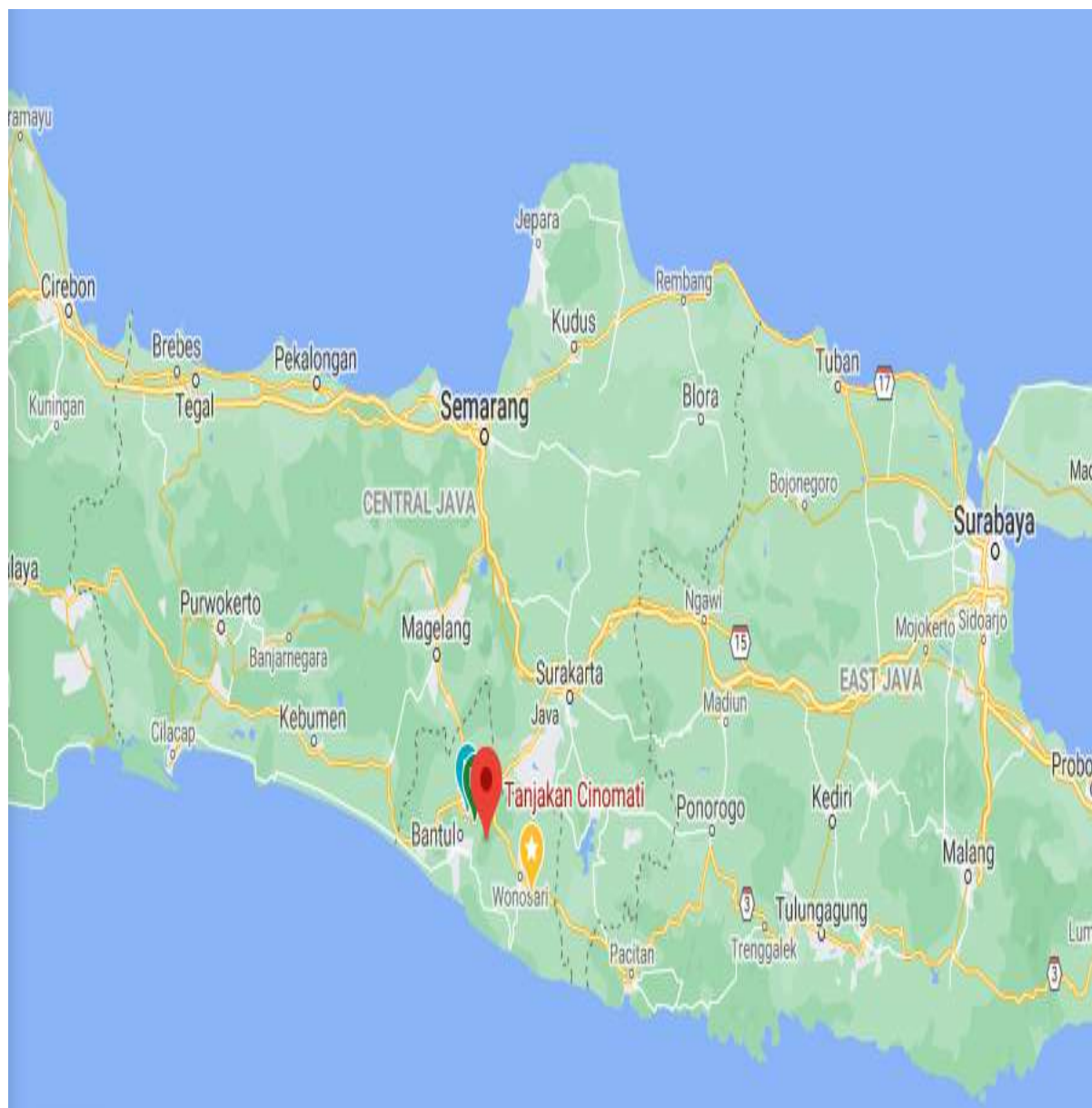


Fig.1: The hills of Cino Mati, Pleret District, Bantul Regency, Special Region of Yogyakarta, Indonesia.

Source: <https://www.google.com/maps/place/Tanjakan+Cinomati/@-7.8856725,110.4423156,17z/data=!3m1!4m5!3m4!1s0x2e7a53e8b145318f:0xd14358bc40ca0f15!8m2!3d-7.8856778!4d110.4445043>



Fig.2: *L. camara* Linn. as a wild plants (yellow arrow).

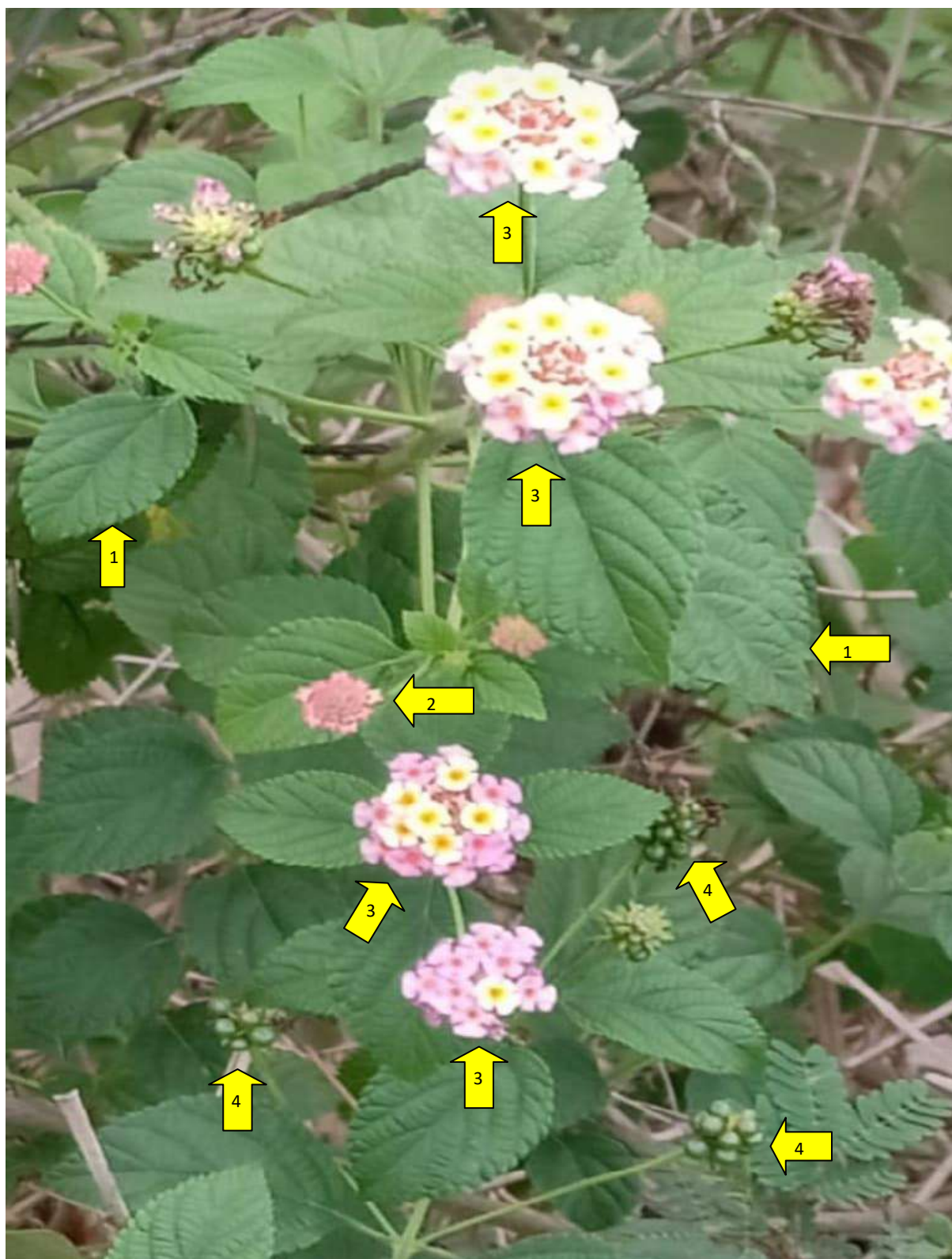


Fig.3:Habitus of *L. camara* Linn. Leaf (yellow arrow 1), young flowers (yellow arrow 2), flowers in bloom (yellow arrow 3), fruit (yellow arrow 4).

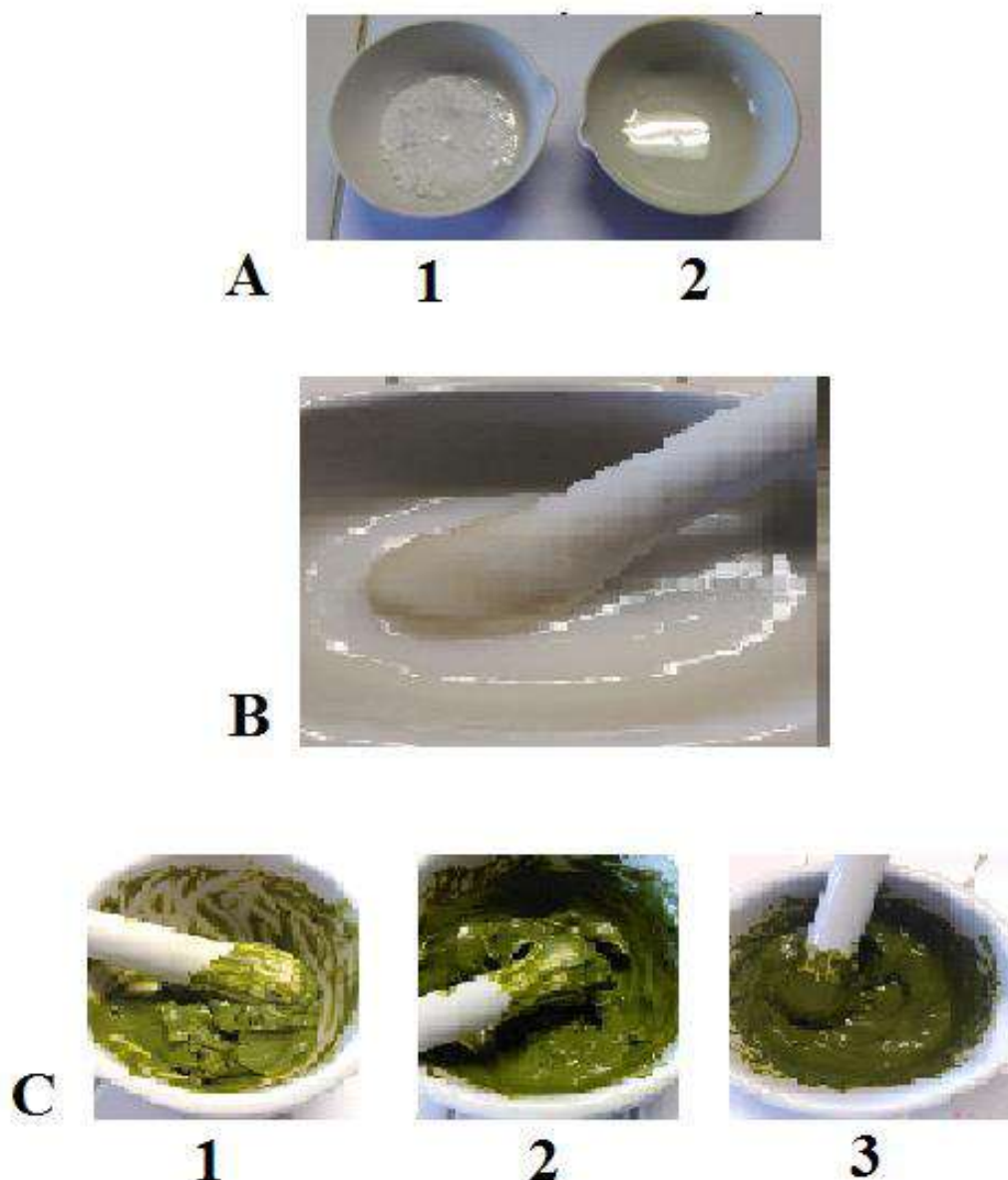


Fig.4:Preparation of *L. camara* Linn. leaf extract cream 3%, 4% and 5%. A. Porcelain cup for heating the cream base. Porcelain cup 1 contains a mixture of stearic acid, cetyl alcohol and liquid paraffin, while porcelain cup 2 contains methyl paraben, triethanolamine, and glycerol. B. The cream base is formed after the cream base components from porcelain cups 1 and 2 are mixed homogeneously by adding aquabidestilata until the weight is 100 grams. C. 1. *L. camara* Linn. leaf extract cream 3% was formed after the cream base was added with *L. camara* Linn. leaf extract 3 grams. C. 2. *L. camara* Linn. leaf extract 4% was formed after the cream base was added with *L. camara* Linn. leaf extract 4 grams. C. 3. *L. camara* Linn. leaf extract cream 5% was formed after the cream base was added with *L. camara* Linn. leaf extract 5 grams.

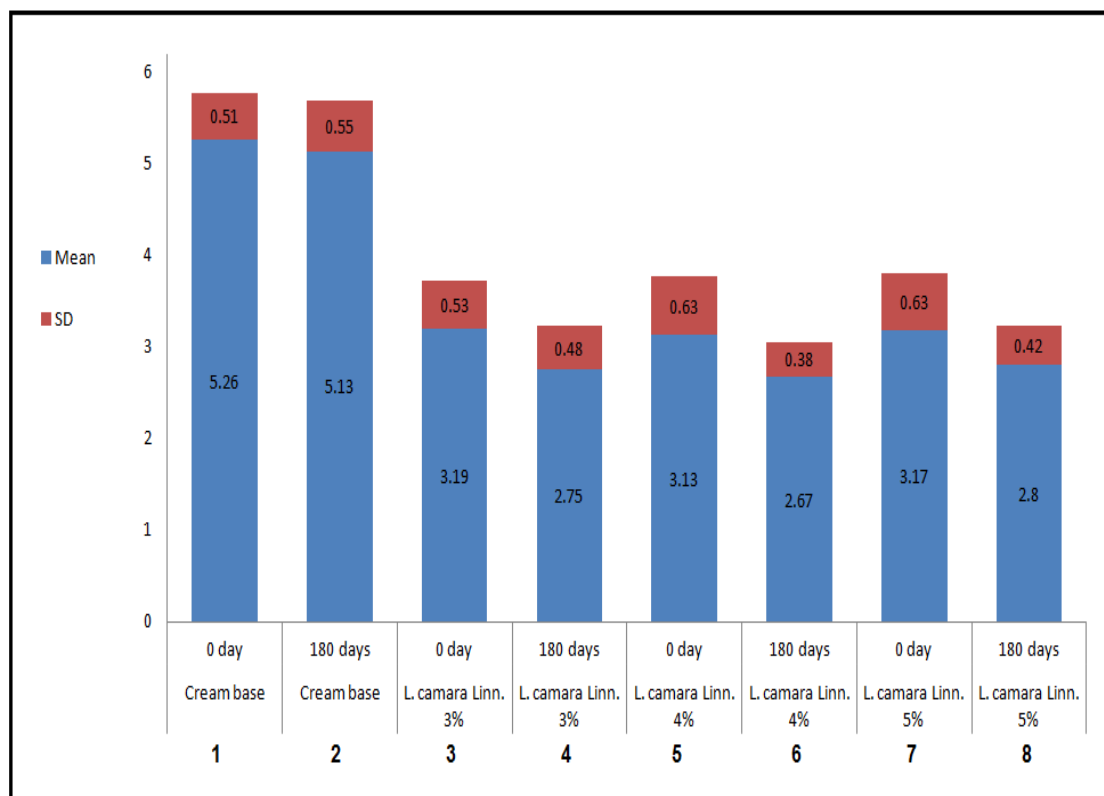
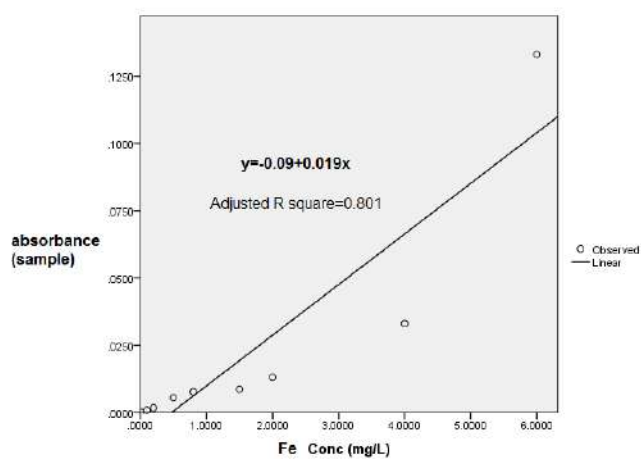
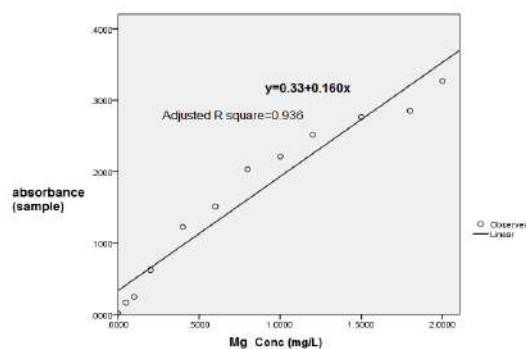


Fig.5: Dispersibility comparison between cream base with *L. camara* Linn. leaf extract cream. 1=2>3,4,5,6,7,8 ($P<0.05$); 3=5=7 ($P>0.05$); 4=6=8 ($P>0.05$); 3>4, 5>6, 7>8 ($P<0.05$).



A.



B.

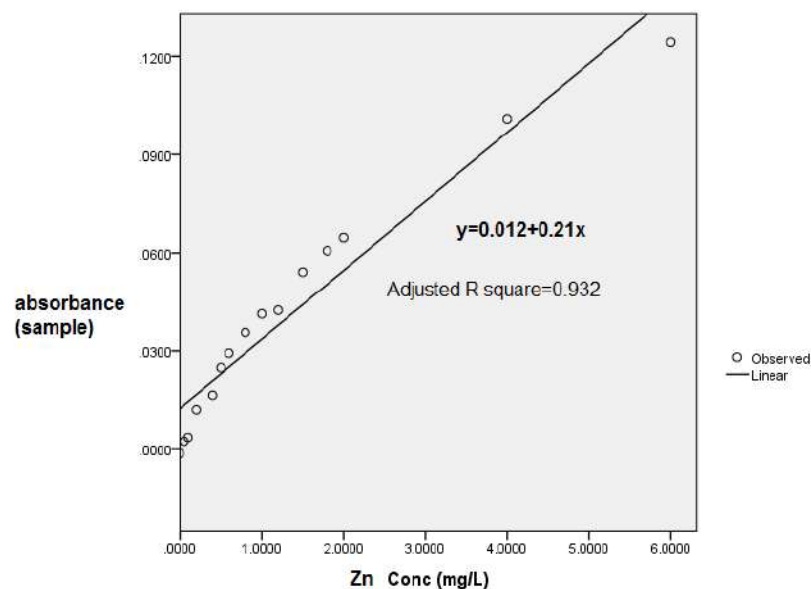


Fig.6:The calibration curve was used for determine levels of Fe, Mg and Zn in *L. camara* Linn. leaf extract cream. The wavelengths was used for determine levels of Fe 248.3270 nm, Mg 285.2125 nm and Zn 213 nm.

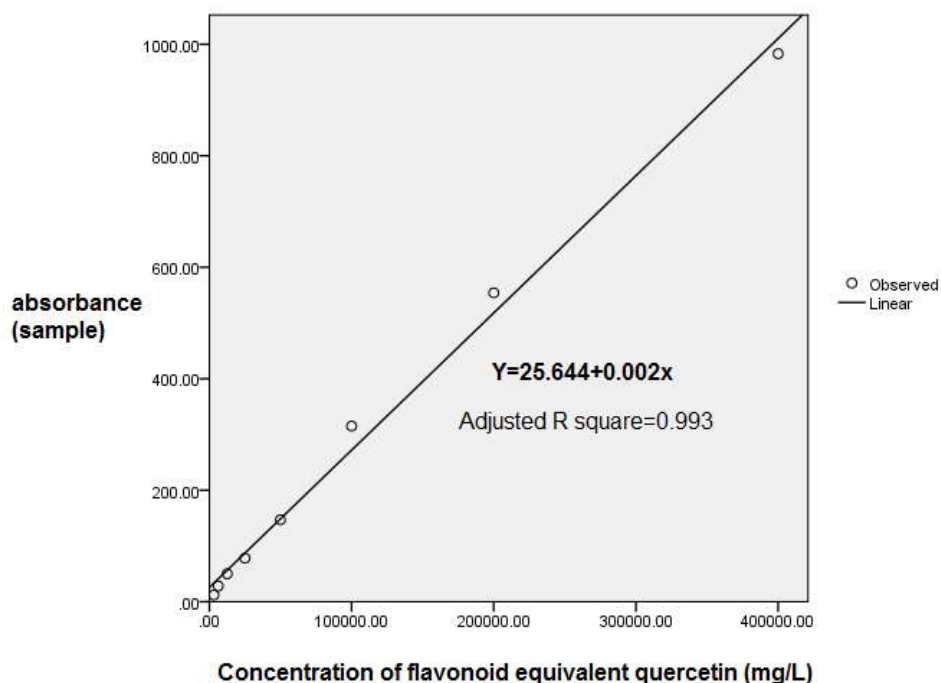


Fig.7:The calibration curve was used to determine the levels of quercetin equivalent of flavonoid in the *L. camara* Linn. leaf extract cream. The wavelengths used for determine levels of quercetin equivalent of flavonoid 510 nm.

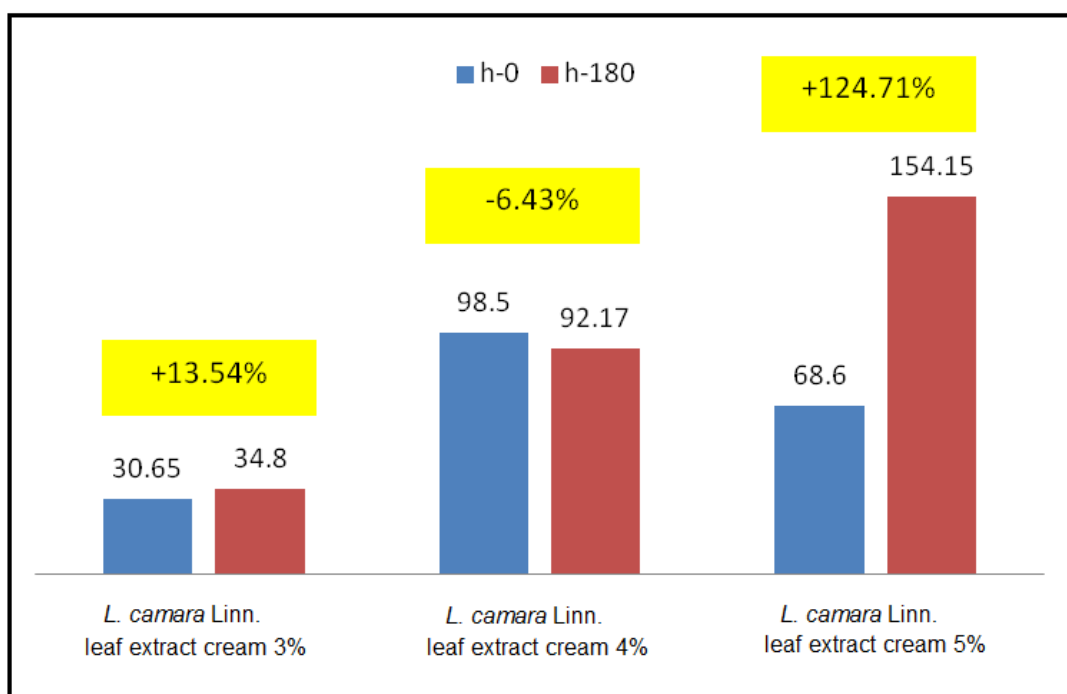


Fig.8:Changes in levels of quercetin equivalent of flavonoid in *L. camara* Linn. leaf extract cream.