

## Archive







International Journal of Research and Review

Journal's DOI: <https://doi.org/10.52403/ijrr>

Vol.8, Issue: 9; September 2021

[Cover Page of Journal is available for download. Click Here](#)

### CONTENTS

S.No.	Articles	Pages
1.	<p>Are We Prepared for the Third Wave? - Knowledge, Attitude and Practice towards COVID-19 among Medical Practitioners in India  <a href="#">Share This</a></p> <p><i>Lokesh Kumar, S, Nirosha, P</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210901">https://doi.org/10.52403/ijrr.20210901</a>] Research Area: Medical Science, Virology</p>	1-8
2.	<p>Prevalence of Ocular Surface Disorder and Dry Eye in Patients with Glaucoma using Topical Antiglaucoma Medications  <a href="#">Share This</a></p> <p><i>Santosh Yadavrao Ingole, Saswati Biswas</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210902">https://doi.org/10.52403/ijrr.20210902</a>] Research Area: Medical Science, Ophthalmology</p>	9-12
3.	<p>Efficacy of FNAC in Diagnosis of Breast Lumps - A Retrospective Study  <a href="#">Share This</a></p> <p><i>Oankar Kumar Mawrya, Richa, Manohar Lal, Prashant Kumar</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210903">https://doi.org/10.52403/ijrr.20210903</a>] Research Area: Medical Science, Pathology</p>	13-17
4.	<p>Effect of Streptozotocin on Liver Histology Damage in Rats Model of Gestational Diabetes Mellitus  <a href="#">Share This</a></p> <p><i>Liganda Endo Mahata, Hirowati Ali, Arina Wietya Murni</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210904">https://doi.org/10.52403/ijrr.20210904</a>] Research Area: Medical Science, Pharmacology</p>	18-22
5.	<p>Correlation of the Neutrophil Lymphocyte Ratio with Malignancy Status in Thyroid Nodule  <a href="#">Share This</a></p> <p><i>Agus Maulana, Dwi Hari Susilo, Marjono Dwi Wibowo</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210905">https://doi.org/10.52403/ijrr.20210905</a>] Research Area: Medical Science, Surgery</p>	23-28
6.	<p>Acute Vestibular Syndrome in Cerebellar Infarction: A Case Report  <a href="#">Share This</a></p> <p><i>Diayanti, Tenti Lestari, Hanik Badriyah Hidayati</i> [ABSTRACT] [PDF Full Text] [DOI: <a href="https://doi.org/10.52403/ijrr.20210906">https://doi.org/10.52403/ijrr.20210906</a>] Research Area: Medical Science, Neurology</p>	29-35

7. Correlation of Platelet-Lymphocyte Ratio towards the Incidence of Follicular Thyroid Carcinoma  Share This 36-42  
*Gagang Guntaran, Kalbungwang, Dwi Hari Susilo, Marjono Dwi Wibowo, Salsudi*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210907>]  
 Research Area: Medical Science; Surgery
  
8. Operative Therapy of Parkinson's Disease and the Role of Neurologist  Share This 43-48  
*Ellisa Dwijayanti, Muhammad Hamdan*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210908>]  
 Research Area: Medical Science; Neurology
  
9. Analysis of Indihome Competitive Advantage Strategy PT Telkom Indonesia (Tbk) Witel Medan  Share This 49-56  
*Alfiqri Imam Budhiman, Endang Sulistyia Rini, Fadli*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210909>]  
 Research Area: Management
  
10. Law Enforcement against the Implementation of the Provisions Payment of Workers' Wages is Reviewed from Aspects of Employment Criminal Law  Share This 57-71  
*Siti Nurhayati, Sumarno*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210910>]  
 Research Area: Law
  
11. Effect of Current Ratio and Debt to Equity Ratio on Price to Book Value with Return on Equity as a Mediation Variable in Property, Real Estate and Building Construction Sector Companies on the Indonesia Stock Exchange for the Period 2015-2018.  Share This 72-80  
*Lina Minah, Nagian Toni, Enda Noviyanti Simorangkin, Galumbang Husagalung*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210911>]  
 Research Area: Business Management
  
12. The Effect of Electronic Word of Mouth (E-Wom) and Brand Image on Repurchase Intention Moderated by Brand Trust in the Garuda Indonesia Airline  Share This 81-91  
*Nasya Nirma Sari, Amrin Fauzi, Endang Sulistyia Rini*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210912>]  
 Research Area: Management
  
13. An Investigation of Learners' Writing Self-Efficacy and Risk Taking in Writing  Share This 92-98  
*Faradina Primarini Noorhaya Sari*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210913>]  
 Research Area: English Education
  
14. A Review: *Cyanthillium chinense* (L.) H. Rob  Share This 99-101  
*Ramya C., Vishnu AS, Nasila K.*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210914>]

15. Determinants of Audit Quality with Auditor's Professionalism Skepticism as a Mediating Variable in Public Accounting Firm (KAP) Medan City:  
*Shabrina Tri Asti Nasution*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210915>]  
Research Area: Business Management 102-114
16. Juridical Analysis of Work Agreements at Sea for Seafarers from the Perspective of Affirming People's Welfare: A Study at the Batam Authority and Harbormaster Office.  
*Akhyanus Marwan, Laily Washliari, Irfan*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210916>]  
Research Area: Law 115-125
17. How Does COVID -19 Affect Thai Students?  
*Prapattra Hongwisat, Thanawat Wuthikanokkan, Chirati Romeyes*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210917>]  
Research Area: Education 126-129
18. A Remote Surveillance System for the Detection of Farmland Invasion by Cattle in Sub-Saharan African Country.  
*Oluwole Abiodun Adegbola, Ifeoluwa David Solomon, Adesina Samuel Oluvaseun, Odegunmi Nathaniel Dare, Peter Olalekan Idowu*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210918>]  
Research Area: Electronic and Electrical Engineering 130-135
19. A Descriptive Study of Clinical Presentation, Etiology and Management in Acute Mechanical Bowel Obstruction.  
*Rajendra Prasad Bugalia, Hariom Meena, Sandeep Kumar, Rajendra Mandia*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210919>]  
Research Area: Medical Science, Surgery 136-141
20. Role of Antibiotics in Neonates Born through Meconium Stained Amniotic Fluid.  
*Ravi Tiwari, Om Shankar Chaurasiya, Sapna Gupta, Sanjaya Sharma, Mayank Singh*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210920>]  
Research Area: Medical Science; Paediatrics 142-148
21. Cytomegalovirus Encephalitis with Decreased Vision in Immunocompromised Patients Treated with Valganciclovir: Case Report  
*Ervin Haradiansyah, Paulus Sugianto*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210921>]  
Research Area: Medical Science; Medicine 149-153
22. Perception and Efficiency Analysis of Agricultural Cooperatives: A Case Study in Hau Giang Province, Vietnam  
*Tien Dung Khong*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210922>]  
Research Area: Economics 154-164

23. The Effect of Work Behavior and Knowledge Management toward Organizational Performance through Employee Performance at PT Bank Aceh Syariah, Aceh-Indonesia. 165-175  
*Muhammad Syafriil Nasution, Sulaiman*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210923>]  
 Research Area: Business Administration
24. The Learning System and the Teachers' Role in Embedding the Character Education Values in Elementary School Students. 176-183  
*Rian Jamhariani, Agus Nuryatin, Hamdan Tri Atmaja*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210924>]  
 Research Area: Education
25. Analysis of Factors Influencing the Determination of Land Compensation Value of PLN Tower on the Construction of TL 150 KV Kuala-Binjai 184-188  
*Saivril A. Nazaruddin Matondang, Sugiharto Pujanggoro*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210925>]  
 Research Area: Property and Valuation Management
26. Analyze the Influence of Talent Management and Knowledge Management on Employee Performance through Employee Retention as Intervening Variable at PT Bhanda Ghara Reksa Drive I Medan. 189-204  
*Nidya Banuari, Yeni Absah, Elisabet Siahaan*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210926>]  
 Research Area: Business Management
27. A Study to Evaluate the Effectiveness of Amla Juice with Honey on Levels of Hemoglobin among B.Sc. Nursing Students with Anemia at Selected Nursing Colleges in Dindugal. 205-209  
*Julie Agnes G. W. Jeyanthi*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210927>]  
 Research Area: Nursing
28. Effect of Extension Training on Technical Efficiency of Maize Farmers in Ogbomoso Agricultural Zone of Oyo State, Nigeria. 210-217  
*Akintunde J. Oluwole, Akintaro O. Segun, Rahman S. Bayonle, Bamidele B. Samuel, Oladosu I. Oladeji*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210928>]  
 Research Area: Agricultural Extension and Rural Development
29. Study of Comparison of Suicidal Cases in the Lockdown Period During First Wave of COVID-19 with that of Suicidal Cases in the Period before it among Dead Bodies Brought for Autopsy at Nalanda Medical College, Patna - A Record Review. 218-223  
*Rajiv Ranjan Das, Kumar Saurav, Radha Raman Singh*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210929>]  
 Research Area: Medical Science, F.M.T.

30. Cutaneous Larva Migrans in Urban Area: A Case Report  
*Tiffany Roelan* 224-227  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210930>]  
 Research Area: Medical Science
31. Prevalence of Diseases in Elderly Patients with Medication Related Problems.  
*Abhishek Pradhan, Fathimath Kamila Thasneem, A R Shabaraya* 228-233  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210931>]  
 Research Area: Pharmacy Practice
32. A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge and Attitude Regarding Vitamin A Deficiency and Its Prophylaxis among Mothers of Under Five Children at Selected village at Tamilnadu.  
*Roslin Mangaiyarkarasi, M. Kunudhevalli, D, R. Karthi* 234-241  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210932>]  
 Research Area: Nursing
33. Study to Assess the Status of Hepatitis B Vaccination and Factors Affecting Antibody Titers Level for Hepatitis B to Various Health Care Workers and Medical Students in Tertiary Healthcare Setup in Himachal Pradesh  
*Aditya Rana, Subhash Chand Jaryal, Anuradha Sood, Anuradha Chaudhary, Isampreet Kaur* 242-246  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210933>]  
 Research Area: Medical Science, Microbiology
34. Aerobic Bacterial Isolates and Their Antibiotic Susceptibility: Patterns of Pus Samples at Tertiary Healthcare Center of Northern India  
*Aditya Rana, Veeteesarveshna Gupta, Subhash Chand Jaryal, Anuradha Sood* 247-251  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210934>]  
 Research Area: Medical Science, Microbiology
35. Role and Responsibility of Nurses in Central Line – Insertion and Maintenance  
*R. Surendra Naik, Avadhesh Kumar Yadav, Rajendra Kumar Sahu, Ram Niwas Sharma* 252-260  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210935>]  
 Research Area: Nursing
36. Analysis of Marketing Strategy of PT. ERP as a Modern Smartphone Retailer.  
*Izzati Agmarina, Arif Inam, Suroso, Joko Ratono* 261-274  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210936>]  
 Research Area: Marketing

37. Maximum Likelihood Estimation using the EM Algorithm  
*Ahsene Lanani*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210937>]  
Research Area: Mathematics 275-277
38. Determinants of Mompreneur Performance in the Pandemic Era (Case Study of Medan City Mompreneurs)  
*Aisyah, Arif Qaedi Hutagalung, Fivi Rahmatus Sofiyah*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210938>]  
Research Area: Management 278-288
39. Comparison of Different Phenotypic Methods for Detection of Vancomycin Drug Resistance in *Enterococcus* Species  
*Deepa Pramod Devhare, Sae Poi*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210939>]  
Research Area: Medical Science, Microbiology 289-293
40. Analysis of the Effect of Macro Economic Indicators and Dow Jones Index on IDX Composite in Indonesia Stock Exchange  
*Isra Rafika Sihombing, Irsad, Ahmad Albar Tanjung*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210940>]  
Research Area: Economics 294-310
41. The Reflection of Physics Pre-Service Teacher Anxiety in Teaching  
*Partono, Friska Octavia Rosa*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210941>]  
Research Area: Education 311-317
42. School-Family Interagency to Enhance Students' Active Participation  
*Aloysius Rusmadi, Tri Joko Raharjo, Rustono, I Made Sudana*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210942>]  
Research Area: Education Management 318-326
43. Vertigo in Systemic Lupus Erythematosus: A Case Report  
*Amira Fitriyananda Putri, Hanik Baariyah Hidayati*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210943>]  
Research Area: Medical Science; Neurology 327-330
44. Relation between Lactic Acid Bacteria (LAB) and *C. trachomatis* Infection on Infertility in Women  
*Zelly Mulyani, Andani Eka Puara, Arni Amir*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210944>]  
Research Area: Medical Science; Infectious Disease 331-337

45. The Relation between Estradiol Levels and Body Mass Index with Fasting Blood Glucose Levels in Premenopausal Women in Padang in 2017 338-344  
*Melani Razuli, Afrivarai, Fika Tri Anggraini*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210945>]  
 Research Area: Medical Science; Physiology
46. Strategy to Increase Competitiveness through the Implementation of Human Resource Performance Management in PT. Garudafood Putra Putri Jaya Tbk 345-361  
*Dani Achmad Fauzi, Syamsul Maarif, Nimmi Zubainarni*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210946>]  
 Research Area: Business Management
47. Design and Development of a Solar-Powered Smart Heater 362-372  
*Ifeoluwa David Solomon, Oluwole Abiodun Adegbola, Peter Olalekan Idowu, Monsuru Abolade Adeagbo, John Adedapo Ojo*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210947>]  
 Research Area: Electronic and Electrical Engineering
48. A Comparative Analysis of LSB, MSB and PVD Based Image Steganography 373-377  
*Alade Oluwaseun, Modupe, Amusan Elizabeth Aadedoyin, Aadedeji Oluwinka Titilayo, Fenwa Olusayo Deborah*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210948>]  
 Research Area: Cyber Security Science
49. Public Attitudes towards Fast Fashion 378-383  
*Phakavan Teerawattananon, Phansa Khuangpad, Renuka Hitopakorn, Varitsara Lapititkhom, Watusiri Limwattana*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210949>]  
 Research Area: Fashion Technology
50. Crop Microclimate Modification to Address Climate Change 384-395  
*Udit Debanshi*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210950>]  
 Research Area: Agriculture
51. Phenotypic and Molecular Detection of Resistance Genes from Multi-drug Resistant Escherichia coli Isolated from Patients Attending Selected Hospitals in Damaturu, Yobe State, Nigeria 396-407  
*Sheriff Wakil, Mustafa Alihaji Isa, Adam Mustapa*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210951>]  
 Research Area: Medical Science; Microbiology
52. Original Research Article on Study of Correlation between Various Clinical Parameters and Hypoxemia in Children with Lower Respiratory Tract Infection of Age 2 Months to 5 Years 408-412  
*Chinnmay Sahu, Deshish Kumar Panda, Swjit Naitik, Saiprasanna Behera*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210952>]

53. Drug-Induced Tardive Dyskinesia  
*Marianto Marianto, Hartono Kosim, I Made Wedastra*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210953>]  
Research Area: Medical Science; Psychiatry 413-422
54. Development of Science Literature Instruments Contained Ethnoscience in Science Subject for Class IV Elementary School Students  
*Nur Khairiyatul Mar'ah, Ani Rusilowati, Eko Purwanti*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210954>]  
Research Area: Education 423-435
55. Predict App Rank on Google Play Using the Random Forest Method  
*Abdul Khalig, Eko Hariyanto, Supina Batubara*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210955>]  
Research Area: Information Technology 436-441
56. Lesser Known Indian Women Educators and Reformers  
*Anasuya Adhikari, Birbal Saha*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210956>]  
Research Area: Education 442-447
57. Integration of Quality Function Deployment Method with Theory of Inventive Problem Solving in an Effort to Improve Clean Water Quality in Tirtanad: Regional Drinking Water Company: Sunggal Medan Branch  
*Zubaidah Kartika Harahap, Humala L. Napitupulu, Meilita Tryana Sembiring*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210957>]  
Research Area: Industrial Engineering 448-452
58. Business Development of Base Transceiver Station (BTS) Infrastructure Contractor PT XYZ  
*Biyal Muhajirin Koswara, Rizal Syarief, Harianto*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210958>]  
Research Area: Business Management 453-467
59. Accuracy of Serum Golgi Protein 73 and Alpha Fetoprotein (AFP) to Diagnose Hepatocellular Carcinoma  
*Karina Dwi Swastika, Gontar Alamsyah Siregar, Diarma Lindarto*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210959>]  
Research Area: Medical Science; Internal Medicine 468-473
60. Implementation of PjBL-Based in Entrepreneurship Subject (Project Based Learning) during the Pandemic Period  
*Efa Waiyu Prastyaningtyas, Widi Wulansari*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210960>]  
Research Area: Economic Education 474-480



61. Evaluation of Information Technology Governance Using the COBIT 5 Framework (Case Study of Integrated Licensing Service Agency Medan City Government).  
*IR, Erwin Setiawan Panjaitan, Fandi Halim, Darwin Siallagan*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210961>]  
Research Area: Information Technology 481-487
62. Digital Marketing Implementation Effectiveness Analysis in Improving the Marketing Performance of Small and Medium Enterprises Managed by LINKS USU.  
*Ikhwan Al Zuhri, Sukaria Simlingga, Iskandarini*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210962>]  
Research Area: Management 488-495
63. Employee Job Satisfaction and Organizational Performance on the National Shipping Company.  
*Prasadjia Ricardianto, Weli Agus Setiawan, Veronica, Imam Sompi, Esti Liana*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210963>]  
Research Area: Transportation and Logistics 497-506
64. Flow and Heat Transfer of the Cu-Water Nanofluid in a Corrugated Channel.  
*Rahima Benchabi, Ahsene Lanani*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210964>]  
Research Area: Mechanical Engineering 507-517
65. Feature Level Fusion of Biometric Images Using Modified Clonal Selection Algorithm.  
*Adeleji, Oluwinka Titilayo, Amusan, Elizabeth Adedoyin, Alade, Oluwaseun, Modupe, Fenwa, Oluwayo Deborah*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210965>]  
Research Area: Information System 518-526
66. Factors Affecting Learners' Satisfaction and Loyalty to the Vietnamese American Training Center, Can Tho City.  
*Mai Tan Dat, Nguyen Quoc Nglii*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210966>]  
Research Area: Management 527-533
67. Marketing Planning "Pineapple Drink" Innovation of Subang Honey Pineapple Processed Drink.  
*Bea Kahfi Arini, Rihan Indradewa, Tantri Yanur Rahmat Syah, Ketut Suryanto*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210967>]  
Research Area: Business Management 534-539
68. Landslide Hazard Zonation along the MH SH-73 at Kelghar Ghat, Satara, Maharashtra.  
*Subhash Vishnu Karande*  
[ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210968>]  
Research Area: Geography 540-547

69. Case Report on Guillain Barre Syndrome: Acute Inflammatory Demyelinating Polyneuropathy. 548-550  
*Chinnu Roy; Jobin Kunjumon Vilapurathu; Dhanya Paul; Helan Kurian*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210969>]  
 Research Area: Pharmacy Practice
70. The Association of Glutathione S-Transferase P1 Polymorphism to Imatinib Mesylate Resistance in Chronic Myelogenous Leukemia Patients According to Haematology Response at General Hospital Haji Adam Malik and Branch Hospital in Kota Medan. 551-557  
*Ainun Basyirah Lubis, Dairion Gator, Savita Handayani, Henny Syahrini*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210970>]  
 Research Area: Medical Science, Internal Medicine
71. Different Mechanism Involvement in the formation of Colorectal Cancer; Mega Review. 558-573  
*Muhammad Ali, Yang Wang, Qi Zhang, Xiaodong Zhu, Abass Mahamoud Ahmed, Mingrui Jiang, Daorong Wang*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210971>]  
 Research Area: Medical Science, Surgery
72. Internal Management Integration Policies and School-Community Relations in Tertiary Institutions in Rivers State. 574-581  
*Sam-Kalagbor, Osaruchi Victoria, Osuji, Catherine U.*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210972>]  
 Research Area: Education
73. The Influence of Servant Leadership and Motivation on the Service of Health Care Units in Way Kanan Regency. 582-587  
*Eko Agus Fitrianto Samah*  
 [ABSTRACT] [PDF Full Text] [DOI: <https://doi.org/10.52403/ijrr.20210973>]  
 Research Area: Public Health

**P-ISSN: 2454-2237**  
**E-ISSN: 2349-9788**

**ijrrjournal.com**

**International Journal of  
Research and Review**

**Vol. 8; Issue: 9; September 2021**



**Galore Knowledge Publication Pvt. Ltd.**  
**www.gkpublication.in**

## Editorial Team

### Editor

- Dr Shankar G. Editor, International Journal of Research and Review, Baroda, Gujarat, India. Email: editor\_ijrr@gmail.com
- Prof. (Dr) Vinay K. Srivastava, Head, Dept. of Psychiatry, KD Medical College Hospital & Research Center, Mathura, UP.
- Dr N.S. Neki, Professor, Dept. of Medicine, Govt. Medical College, Amritsar, Punjab, India.
- Dr. John Lenon E. Agatep, Executive Director - ACLC, Macau Ltd., Philippines.

### Editorial Team Members

- Dr. Manisha Jindal, Dean, School of Medical Sciences and Research, Sharda University, Greater Noida, India
- Dr. Seema Piyu Deo Mahant, Professor & Head of The Department (General Medicine), Govt. Medical College, Datia (M.P.), India
- Dr. Sonali Jain, Assistant Professor in Microbiology, Goldfield Institute of Medical Sciences, Faridabad, India.
- Dr. Fazal-Ur Rehman, Associate Professor, Dept. of Anatomy, Jawaharlal Nehru Medical College, AMU, Aligarh, India
- Dr. Arunima Chaudhuri, Associate Professor, Department of Physiology, Rampurhat Government Medical College and Hospital, Rampurhat, West Bengal, India.
- Dr. P. Krishna Kishore, Associate Professor, Dept. of Biochemistry, College of Dental Sciences & Research Centre, Ahmedabad, Gujarat, India
- Dr. Ashish Tyagi, Assistant Professor, Dept. of Forensic Medicine, S.H.K.M. Government Medical College, Nalkar, Nuh - 122107 (Haryana).
- Dr. Swarup P Kulkarni, Professor and HOD, Ashokrao Mane Ayurvedic Medical College and Hospital Vathar Tarf Vadgaon, Dist. Kolhapur, Maharashtra
- Dr Lalitesh Kumar Thakur, Specialist- at Institute of Pesticide Formulation Technology, Ministry of Chemicals & Fertilizers, Govt of India), Gurgaon.
- Dr Abubakar SadiqMagaji, Dept. of Mathematical Sciences, Faculty of Science, Kaduna State University, Nigeria
- Hamid Reza Mirkarimi, Department of Plant Breeding, Faculty of Agriculture, Science and Research Branch, Islamic Azad University, Tehran, Iran
- Dr Angani Mary Talatu, Lecturer II, Department of Veterinary Medicine, College of Veterinary Medicine, Federal University of Agriculture, Makurdi.
- Dr V.G. Shobhana, PhD (Agri- Biotechnology), Madurai, Tamil Nadu, India
- Dr. Siby Mathew, Assistant Professor & Research Guide, Post Graduate Department of Botany, Vimala College (Autonomous), Thrissur-9, Kerala, India.
- Dr. Kanakam Elizabeth Thomas, Associate Professor, Dept. of Microbiology, Asan Memorial Dental College, Chengelpattu
- Dr. Subhash Chanda, Associate Professor, AC College, Jalpaiguri, WB, India
- Dr Dipak Kumar Hazra, Asst. Prof., Dept. of Agricultural Chemicals, Bidhan Chandra Krishi Vishwavidyalaya, Kalyani, Nadia, WB, India
- Binu Thomas, Guest Faculty, PG Dept. of Botany, Deva Matha College, Kottayam, Kerala, India
- Dr S. Ponnam, Assistant Professor (Environmental Sciences), Mother Teresa College of Agriculture (Affiliated to Tamil Nadu Agricultural University), Illuppur, Pudukkottai, TN, India
- Dr Narendra Kumar Jatav, Lecturer & Head of Dept., Department of Plant Pathology, PND Agricultural College, Gajsinghpur, District Sri Ganganagar, Rajasthan, India
- Dr Subha Ganguly, Scientist (Food Microbiology) & Scientist In-charge, Department of Fish Processing Technology, Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, Kolkata, India
- Dr Abd Elmoneim Ahmed Elzain, Associate Professor in Physics, Department of Physics - Kassala University - Sudan & Department of Physics - Qassim University, Saudi Arabia.
- Dr. Ajay B. Gadicha, HOD, Computer Science and & Asst. Prof., P. R. Pote Patil College of Engineering & Management, Anwaravati, Maharashtra, India
- Lusekelo Kibona, Lecturer, Information & Communication Technology, Ruaha Catholic University, Iringa, Tanzania
- D.S. Pushparani, Assistant Professor, Department of Biochemistry, SRM Dental College, SRM University, Chennai, India
- Dr. Bijender Singh Chauhan, Professor, Dept. of Applied Art, College of Art (Delhi University), New Delhi
- Prof. Lokanath Suar, Faculty in Law, G.M. Law College, Puri, Odisha, India
- Dr. G.C. Samaraweera, Senior Lecturer, Department of Agricultural Economics, Faculty of Agriculture, University of Ruhuna, Mapalana, Kamburupitiya, Sri Lanka
- Dr. Vijendra Singh Solanki, Assistant Professor, Department of Chemistry, School of Liberal Arts & Sciences, Mody University Of Science and Technology Lakshmanagarh, Sikar, Rajasthan
- Dr. C. Jayakumar, Teaching Fellow, Department of Applied Science and Technology, A.C. Tech, Anna University, India.
- Sunil J Kulkarni, Associate Professor, Chemical Engineering Department, Ghada Institute of Technology Level, Khed, Maharashtra, India.
- Dr. Yogesh Kumar, Veterinary Officer, Department of Animal Husbandry, Government of Rajasthan, India
- Dr. Brijesh H. Joshi, In-Charge Principal, Academic & Administration, B.L. Parikh College of B.B.A., Palanpur
- Prof. S. Rajathu, HOD of Child Health Nursing, Arun College of Nursing, Vellore, Tamil Nadu.
- Prof. Loc Nguyen, Director of International Engineering and Technology Institute, Vietnam
- Dr Rubee Singh, Assistant Professor, Institute of Business Management, GLA University, Mathura, India

- K M Vishnu Nambodiri, Head of the Department of History, Mar Thoma College, Tiruvalla, Kerala, India
- Ruffi Mohammed, Associate Professor, Department of Mechanical Engineering, Ramachandra College of Engineering, Eluru, West Godavari District, Andhra Pradesh
- Dr. Sonia Kaul Shali, Professor of Criminology and Criminal Justice Administration, Unitedworld School of Law, Karnavati University, Gandhinagar, Gujarat
- Dr. D. Venkadesh, Assistant Professor, PG and Research Department of Commerce, A.V.V.M Sri Pushpam College (Autonomous) Pooné, Thanjavur District, Tamilnadu
- Selvaganapathy Manoharan, Assistant Professor, CK College Of Engineering And Technology, Cuddalore, Tamil Nadu
- Vishal A. Kanjariya, Assistant Professor, Information Technology Department, Burla Vishvakarma Mahavidyalaya (BVM), Engineering College, Vallabh Vidyanagar, Anand, Gujarat, India.
- Dr. Anita G Chandwani, Librarian (Asst. Prof.), Rajkumar Kewakraman Kanya Mahavidyalaya, Nagpur, Maharashtra.
- Prof. Dr. Senthil Kavitha R., Principal, ESIC College of Nursing, Gulbarga, Karnataka
- Mrs. Bemina JA, Assistant Professor, ESIC College of Nursing, Gulbarga, Karnataka.
- Pushparaj Pal, Asst. Prof. (ECE) in ICL Engineering College, Ambala, Haryana.
- Dr. Radha Arora, Associate Professor, M.G.N College of Education, Jalandhar, Punjab
- Prof. Ajay Kumar Sharma, Department of Physics, B.C. College, Asansol, West Bengal
- Dr. Nilesh Jain, Associate Professor (Pharmaceutical Sciences), Sagar Institute of Research Technology & Science-Pharmacy, Bhopal, Madhya Pradesh
- Vinodkumar Mugada, Assistant Professor, Department of Pharmacy Practice, Vignan Institute of Pharmaceutical Technology, Visakhapatnam, Andhra Pradesh
- Dr. Dharmendra Solanki, Professor and Principal, Lakshmi Narain College of Pharmacy Indore MP
- Dr. Pallav Mukhopadhyay, Assistant Professor, Department of Journalism & Mass Communication, West Bengal State University, Barasat, West Bengal, India
- Dr. P. Sudhalakshmi, Assistant Professor of English, PG & Research Department of English, Vellalar College for Women, Erode, India
- Rajeev Prasad, Chief Engineering Geologist, Hindustan Construction Co. Ltd., India.
- Neha Bharti, Assistant Professor, Dept. of Computer Science and Engineering, Jaipur Engineering College and Research Center, Jaipur, Rajasthan.
- Dr. Neeta Gupta, Associate Professor, Department of Psychology, D.A.V. PG College, Dehradun.
- Dr. Bilal AYDOĞAN, Head of Department of Electrical and Energy, Mehmet Akif Ersoy University, Turkey.
- Dr. A. Sundar Raj, Associate Professor, Department of Electronics and Communication Engineering, E.G.S. Pillay Engineering College, Nagapattinam
- Dr. J. Srinivas, Associate professor & HOD (Civil Engineering), Adams Engineering College, Telangana, India
- Dr. A.C. Deepa, Assistant Professor, Dr. N.G.P. Arts and Science College, Coimbatore
- Dr. Manoranjan Tripathy, Research Associate, Research and Publication Cell, Dev Sanskriti University, Haridwar, Uttarakhand.
- Dr. Froilan D. Mobo, Associate Professor II, Philippine Merchant Marine Academy, Philippines
- Dr. A.R. Kanagaraj, Professor & Assistant Controller of Examinations, Department of Corporate Secretaryship, Dr N G P Arts and Science College, Coimbatore
- Dr. Mohammad Anamul Haque, Physiotherapist, Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arab.
- Dr. Gargi Dhar, Assistant Professor (Nutrition), School of Public Health, College of Health Science and Medicine, Wolaita Sodo University, SNNPR, Ethiopia.
- Dr. Sachidananda Malliyappa, Lecturer, Department of Oral and Maxillofacial Pathology and Oral Microbiology, AB Shetty Memorial Institute of Dental Sciences, Mangalore.
- Dr. P. Malayadi, ICSSR SENIOR FELLOW, (Research Advisor in Management & Commerce), Center for Economic and Social Studies (CESS), (An ICSSR Research Institute, Ministry of HRD, Govt. of India), Begumpet, Hyderabad-500016 India.
- Dr. Rincy Yesudas, Assistant Professor, Department of Food & Biotechnology, Jayoti Vidyapeeth Women's University, Jaipur
- Dr. Radha K., Vice-Principal, Bhopal Nursing College, Bhopal Memorial Hospital and Research Centre, (DHR, Govt of India), Bhopal.
- Prof. Kuldeep Bhalerao, Assistant Professor, Bharati Vidyapeeth's Institute of Management Studies and Research, Navi Mumbai.
- Dr. Chandan Kumar, Professor & Principal, Motiwala College of Physiotherapy, (Maharashtra University of Health Sciences) Motiwala Nagar, Gangapur-satpur link road via Ashok Nagar, Gangapur, Nashik, Maharashtra. 422012
- Dr. Jebin Abraham, Faculty of Pulmonary Medicine, Government Medical College, Patiala, Punjab, India
- Dr. Deo Mami Tripathi, Associate Professor of Zoology, University Department of Zoology, Pt. L. M. Sharma Campus Rushikesh SDSU University, Tehri Garhwal, Uttarakhand, India
- Dr. King Solomon Ebenezer, Senior Scientist, Bioscience Research Foundation, Chennai
- Dr. P. Gurusamy, Assistant Professor & Head, PSG College of Arts and Science, Coimbatore
- Swapnil D. Tayade, Ph.D Scholar (Genetics and Plant Breeding), Dr. P. D. K. V., Akola (M.S.)
- Dr. P. Kiran Kumar, Associate Professor, Vignan Institute of Technology & Sciences, Hyderabad
- Dr. P. Sriraj, Asst. Professor, PG Department Of Business Economics & Economics, D.G. Vaisnav College Chennai
- Dr. Gamma Baradia, Associate Professor & Consultant, Malla Reddy Medical College For Women, Hyderabad.
- Dr. (Mrs.) R. Ponchitra, Professor & Vice Principal, MGM New Bombay College of Nursing, Kamothe, Navi Mumbai, Maharashtra
- Hebsiba P., Associate Professor, Dept. Of Medical Surgical Nursing, Sree Gokulam Medical College & Research Foundation, Venjaramoodu, Trivandrum.
- Dr. Harish N., Lecturer in Economics, Adarsha PU College, 1st Block, 12th cross, R.T. Nagar, Bangalore
- Febi Junaidi, Researcher, Sebelas Maret University, Indonesia.
- Dr. Dnyaneshwar Kantaram Jadhav, Assistant Professor, Kayachikitsa Department, Shri Dhanwantri Ayurvedic Medical College And Research Center, Mathura
- Dr. Abd Elmomeni Ahmed Elzain, Professor, Department of Physics, University of Kassala, Kassala, P.O Box: 266, Sudan. & Department of Physics, College of Science & Arts in Uqlat Al Suqur, Qassim University, P.O Box: 111, Saudi.
- Dr. Rajathi Sakthivel, Vice-Principal HOD Child health Nursing, Hindu Mission College Of Nursing, West Tambaram, Chennai-600 045.
- Dr. Namani Satyanarayana, Anatomy Unit, Faculty of Medicine, AIMST University, Semeling, Bedong 08100, Kedah, Malaysia.

# Acute Vestibular Syndrome in Cerebellar Infarction: A Case Report

Diayanti Tenti Lestari<sup>1</sup>, Hanik Badriyah Hidayati<sup>2</sup>

<sup>1</sup>Department of Neurology, <sup>2</sup>Department of Neurology,  
Faculty of Medicine, Airlangga University, Surabaya, Indonesia

Corresponding Author: Diayanti Tenti Lestari

## ABSTRACT

**Introduction:** Acute vestibular syndrome (AVS) is characterized by rapid onset of vertigo, nausea and vomiting, and gait unsteadiness in association with head motion intolerance and nystagmus, lasting days to weeks. Although the majority of AVS patients have acute peripheral vestibulopathy, some may also have brainstem or cerebellar strokes. Cerebellar infarctions sometimes only cause vertigo. The Head Impulse Test, skew deviation, and nystagmus testing provide for great sensitivity and specificity in distinguishing between peripheral vestibular impairment and stroke.

**Case:** A 41-year-old male patient suffered from acute-onset vertigo and dizziness about 5 hours before admission, which started when he started doing his morning routine. Patients also feel gait unsteadiness and almost fall to the left side. There was no weakness in extremities, skew face or slurred speech. Patient's neurological status showed the cerebellar examination was positive left dysmetria, left dysdiadochokinesia, the Romberg test open eye fell to the left, normal Head Impulse Test (HIT), with horizontal bidirectional nystagmus and negative skew deviation test. Cerebellum infarction was discovered using computed tomography imaging. After passing through the acute stroke period, patients are offered symptomatic therapy in the form of betahistine, antiplatelet medication, and vestibular rehabilitation planning. On the tenth day after the onset, the patient's symptoms began to improve.

**Conclusion:** Proper diagnosis of acute vestibular syndrome will guide the necessary tests. The HINTS oculomotor test at the bedside can detect acute vestibular stroke.

**Keywords:** acute vestibular syndrome, vertigo, cerebellum, HINTS

## INTRODUCTION

Acute vestibular syndrome is characterized by the sudden onset of dizziness/vertigo, nausea and vomiting, and unsteadiness that lasts from days to weeks. This syndrome causes static and dynamic imbalances in the vestibular system on one or both body sides.<sup>(1)</sup> The occurrence of dizziness/vertigo due to central lesions usually occurs in association with other neurological signs and symptoms, and the diagnosis of vertigo is isolated from lesions of the brainstem and cerebellum. <sup>(1)</sup> Dizziness/vertigo is the most common symptom of the posterior circulation ischemia. Based on literature, 62% patients with vertigo due to vertebrobasilar infarction had at least one episode of vertigo and 19% patients presented vertigo as the initial symptom. <sup>(1)</sup> Acute vestibular syndrome due to stroke is mostly due to lesions in the posterior inferior cerebellar artery (PICA) region of cerebellum. <sup>(2)</sup> Cerebellum lesions cause variety of audiovestibular symptoms and nystagmus. <sup>(2)</sup> Nystagmus is caused by damage to the intercalate nucleus and paramedian tract (PMT) cell group. <sup>(2)</sup>

Dizziness and vertigo assemble for 4.0% of visits to the emergency department and associated stroke in 3.2–4.0% of cases. <sup>(2,3)</sup> Data show that approximately 15000 to 25000 cases have a morbidity due to misdiagnoses at the time of initial

admission. (4) Twenty-five percent of patients with vascular risk factors who present to emergency department with isolated severe vertigo, nystagmus, and postural instability, turned out to have cerebellar infarction in the region of the medial posterior inferior cerebellar artery PICA (mPICA) region. (5) Dizziness/vertigo caused by acute vestibular syndrome have three times higher risk of cerebrovascular causes than dizziness without the syndrome of vestibular acute.

The prevalence of the causes of vertigo/dizziness Cerebrovascular in acute vestibular syndrome group was 10.0 % of strokes and transitory ischemic attack (TIA), this is higher when compared to the occurrence of cerebrovascular causes among vertigo/dizziness patients who are not acute vestibular syndrome as much as 3.6%. (3) This paper is intended to aid in the study of dizziness or sudden vertigo in posterior circulation strokes, particularly cerebellar infarction.

## CASE REPORT

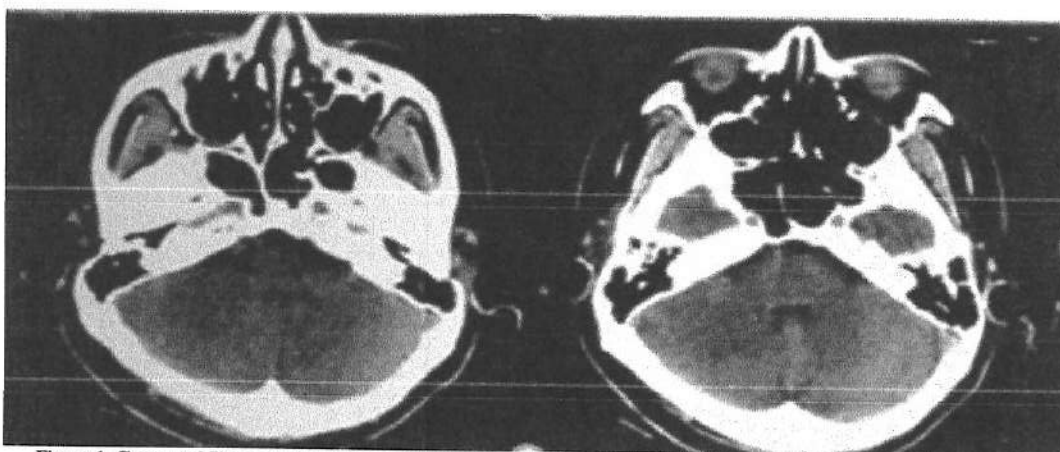


Figure 1. Computed Tomography CT scan of the head without contrast, axial section; acute infarction of the cerebellum

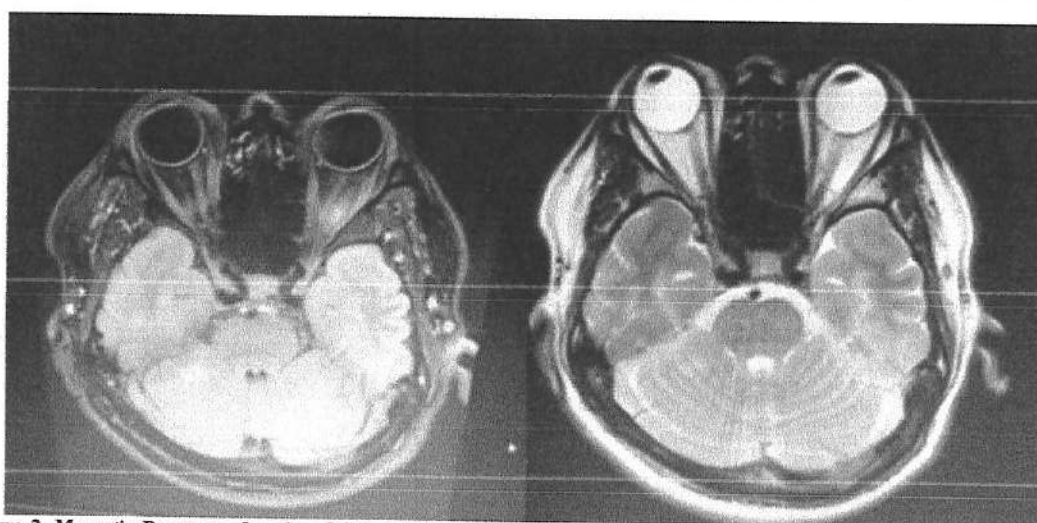


Figure 2. Magnetic Resonance Imaging (MRI) of the Head; Restricted diffusion on Diffuse weight Imaging (DWI), cerebellar hyperintense on T2 Fluid Attenuates Inversion Recovery FLAIR

A 41-year-old man suffered from acute-onset vertigo and dizziness about 5 hours before admission, which started when he started doing his morning routine. The

patient described that the head is floating as if it is light and everything around him seemed to be moving. The symptoms were not prompted by changes in his head, and

they did not improve with sleep. The patient stated that he would want to fall to his left side. The patient's hands and feet are unaffected. On the route to the hospital, the patient vomits, his head jerks, and he becomes uneasy. He denied any previous headaches, tingling, visual field abnormalities, double vision, swallowing difficulties, convulsions, or fever. The patient's previous medical history includes hypertension from 5 to 6 years ago, which was not routinely treated, and no previous stroke, tumor, or lump elsewhere, which the patient disputed. Traditional medicine was used previously, and no painkillers were used. Patient has been a 15-year smoker who smokes 5-10 cigarettes per day and does not drink alcohol. There are no relatives with hypertension, heart disease, diabetes mellitus, or stroke in the family history. Blood pressure was 210/150 mmHg, pulse was 98 beats per minute, respiratory rate was 18-20x/minute, temperature 36.6° Celsius on general examination. Bidirectional horizontal nystagmus without hearing loss, excellent motor function, and normal exteroceptive and proprioceptive sensory were discovered on neurological examination. Both sides of the extremities have normal deep tendon reflexes, with no abnormal or primitive reflexes. Dysmetria on the left side, left dysdiadochokinesia, positive Romberg's test, and a fall to the left side were the cerebellar signs. The Head Impulse HIT test revealed a bidirectional horizontal nystagmus and no ocular deviation, which were both within normal ranges. Fasting glucose readings were 113 mg/dl, postprandial blood sugar was 150 mg/dl; urea was 15 mg/dl; serum creatinine was 1.57 U/L; albumin was 4.5 g/L; SGOT was 18 U/L; SGPT was 16 U/L; CRP was 9.4; WBC was 13,200/l; Hb was 1 5.2 g/dl; platelets were 425,000/l. HbA1C levels 5.7 percent, lipid profile: cholesterol 245 mg/dl, triglycerides 110 mg/dl, HDL 42 mg/dl, LDL 89 mg/dl, electrolyte levels sodium 145 mmol/L, potassium 4.0 mmol/L, chloride 103 mmol/L, HbA1C values 5.7

percent. Cerebellar infarct, hypodense region in the cerebellum, can be seen on a CT scan of the head without contrast.

After the initial phase of the stroke, patients were given betahistine 24 mg every 12 hours, Amlodipine 10 mg every 24 hours, Domperidone 1 tablet every 12 hours or as required, Acetyl Salicylic Acid 100 mg every 24 hours, Simvastatin 20 mg every 24 hours, and Cawthorne-Cooksey exercise.

## DISCUSSION

Acute vestibular syndrome (AVS) is characterized by acute onset of prolonged vertigo (days to weeks) with spontaneous nystagmation, postural instability and autonomic symptoms such as nausea or vomiting. (1,4,5) Eleven percent of patients with cerebellar infarction showed clinically isolated vertigo and most (96%) had medial branch PICA territory infarction, including nodules. (6) Cerebellar stroke will cause severe ataxia, visual disturbances, headache, and vertigo. However, about 10% of patients with cerebellar infarction experience only vertigo or nausea and vomiting. (7)

Pathophysiology of acute vestibular syndrome on cerebellum lesions is associated with vestibular pathway and vascularisation into the vestibular system. The cerebellum receives projections from the vestibular labyrinth, vestibular nerve, and vestibular nucleus in the brainstem and the projections back to the vestibular nucleus to control oculomotor and postural reflexes. The cerebellum is also involved in the visual suppression of ocular vestibular responses, including nystagmus caused by acute vestibular dysfunction. (8) The blood supply to the peripheral vestibular labyrinth, vestibular nerve, the vestibular nucleus in the brainstem and cerebellum originates from the vertebrobasilar artery system. (8,9) The internal auditory arteries branch is a branch of the AICA's Anterior Inferior Cerebellar Artery, supplying the vestibular and cochlear labyrinths. Branches of the vertebral and basilar arteries supply the vestibular nuclei in the brainstem. (6,8) The



posterior and anterior cerebellar arteries provide blood supply to the inferior cerebellum and the flocculonodular lobe which are parts of the cerebellum that are closely related to the vestibular system. (6,8)

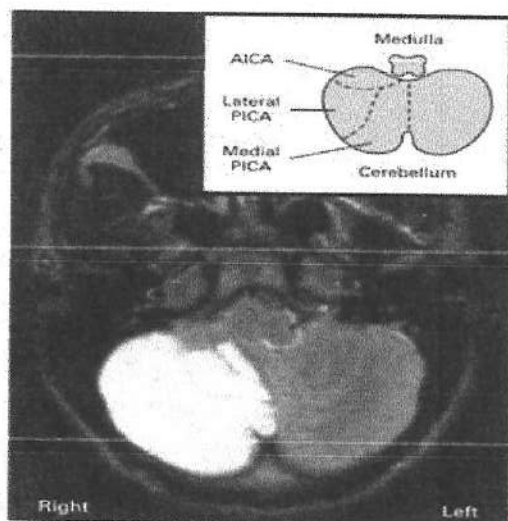


Figure 3: Magnetic Resonance Imaging MRI of right inferior cerebellar infarction. Pathophysiological vascularization illustration posterior inferior cerebellar artery (PICA) and anterior inferior cerebellar artery (AICA). (8)

The pathophysiology of acute vestibular syndrome also occur through involvement of the structures of the vestibular nucleus, root entry zone of cranial nerve VIII at the border of the pontomedulla, dorsolateral or caudolateral rostral medulla, paramedian pons or mesencephalon tegmentum, and inferior cerebellar peduncle. (6) Cerebellar vestibular ocular reflex (VOR) function and associated vestibular abnormalities. Purkinje Cell of vestibulocerebellum have an inhibitory effect, usually in the ipsilateral vestibular nucleus. Damage of these Purkinje cells tend to increase the tonic activity of ipsilateral vestibular nucleus, causing spontaneous cerebellar nystagmus on the lesion side. However, patients with floccular lesions exhibit much stronger spontaneous nystagmus in response to abnormal head impulses, suggesting that the flocculus has a much more important role in controlling VOR than does the cerebellar tonsil. (10)

Diyan et al, 2020 and Kim Ah, 2012, described the most common causes of posterior circulation infarcts are posterior inferior cerebellar artery (PICA) and superior cerebellar artery (SCA) compared to the anterior inferior cerebellar artery (AICA). Patients with cerebellar infarction have clinical features of vertigo, nausea and vomiting, horizontal nystagmus, limb ataxia, unbalanced gait, and headache, may be in the occipital, frontal, or upper cervical region. Frequently, the clinical picture of cerebellar artery infarction results from infarction of the lateral medulla or pons, and does not involve the cerebellum. These clinical features include trigeminal and spinothalamic sensory deficits or Horner's syndrome. (5,6) The patient we reported also presented with acute vertigo, head discomfort, such as floating sensation accompanied by a feeling of tumbling at the acute onset and may lead to acute-onset limb ataxia and associated vascular risk factors.

Also mentioned by Hotson and Baloh, 1998; The sudden onset of isolated vertigo lasting for minutes in a person with risk factors for stroke suggests an ischemic attack in the vertebrobasilar system or transient ischemia of the vestibular labyrinth. Transient ischemic attacks often last for less than 30 minutes. Isolated transient vertigo may precede a stroke in a branch of the vertebrobasilar artery that presents with similar symptoms over a span of weeks or months. (8) In acute vestibular syndrome, factors that lead to stroke should be considered, such as; age over 60 years, history of hypertension or diabetes mellitus, accompanying symptoms refer to the central nervous system, spontaneous and acute onset of symptoms for the first time. (11)

Bed side examination of acute vestibular syndrome is important to establish the diagnosis, even considered sensitive and specific for acute vestibular syndrome, it's hard to differentiate vascular vertigo isolated from peripheral vestibulopati acute. As described by Kim JS and Choi KD, 2013, indicates that bed side

examination of oculomotor has three steps for hints: Head impulse test, nystagmus and Test of Skew Deviation consists of a head Impulse Test HIT, nystagmus, and the deviation of the eye is more sensitive to stroke while scheduling definitive imaging. (1,2)

If a patient shows any signs of central vestibular dysfunction such as vertical nystagmus in usual position, nystagmus due to head shaking movements, asymmetric oculomotor dysfunction, or

postural instability that is severe enough to fall during a vertigo attack, the doctor can easily detect that the vertigo stems from central vestibular dysfunction. (5) An examination protocol that combines the Head Impulse test HIT with looking for nystagmus that changes direction in eccentric gaze or skew deviation is 100% sensitivity and 96% specificity for stroke identification, whereas diffusion weighted DWI Magnetic Resonance Imaging MRI can be missed in 12% of cases. (5,12)

**Table 1. Characteristics of the clinical presentation of acute unilateral vestibulopathy, stroke in the posterior inferior cerebellar artery PICA and stroke in the anterior inferior cerebellar artery AICA (13)**

	Acute Unilateral Vestibulopathy	Stroke (PICA)	Stroke (AICA)
Nystagmus	Spontaneous horizontal unidirectional	Central form of nystagmus	Central form of nystagmus
Qualitative Head Impuls Test	Abnormal to one side, fast phase nystagmus	Normal bilateral	Abnormal on the side of the lesion
Quantitative Head impuls Test (gain)	Ipsilateral:0.2-0.4 Contralateral: 0.6-1.0	Ipsilateral:0.7-0.8 Contralateral:0.7-0.8	Ipsilateral:0.3-0.4 Contralateral: 0.5-0.6
Skew deviation	-	There's a possibility	There's a possibility
Vascular Risk	Low Risk	High Risk	High Risk
Hearing disorders	probability does not exist	-	Often there

HINTs examination is useful to reduce misdiagnosis of stroke or acute vestibular syndrome and should be studied in head-to-head for the comparative cost-effectiveness of the neuroimaging by MRI DWI. (13) The research of Kattah et al, 2009 and Choi et al, 2017 also proves that finding one of the 3 dangerous oculomotor signs (normal Head Impulse Test HIT or ni horizontal stagmus that changes direction in eccentric gaze or skew deviation) is more sensitive than the presence of other neurologic signs to identify if the acute vestibular syndrome is caused by stroke. (14,15) The patient in this case report showed 2 out of 3 HINTS examination results that lead to stroke, namely normal on the Head Impulse Test (HIT) and the presence of bidirectional horizontal nystagmus, plus a deficit in the cerebellar system such as acute limb ataxia and cerebellar signs, dysmetria.

A computed tomography (CT) scan of the head is routinely done in individuals with acute vestibular dysfunction. CT is a fairly reliable diagnostic for cerebral bleeding; however, when conducted within

12 hours of the beginning of the event, the sensitivity of CT for ischemic stroke is just 39%. With a sensitivity of 99 percent, Magnetic Resonance Imaging (MRI) with sequence Diffusion Weight Imaging (DWI) is significantly more accurate. Another study discovered that the sensitivity of MRI is reduced in minor lesions, stroke at the fossa posterior region, and if the MRI is conducted within 24 hours of the beginning of symptoms rather than within 2 to 4 hours. The DWI MRI procedure might be to blame for some of the decreased accuracy. (13) However, a recent meta-analysis indicated that, whereas only 6.8% of patients with ischemic stroke had negative DWI MRI findings, posterior circulation strokes had this outcome five times more frequently. Concurrent clinical evaluation and vascular imaging (CT or MR angiography to detect the relevant occlusion or stenosis) may be useful in determining a diagnosis. (9)

In most cases, only CT is performed, although in fact MRI is a better method for visualizing pathology in the posterior cranial fossa as demonstrated by the higher diagnostic yield of MRI in this and other

studies. The use of CT as the only diagnostic investigation has several reasons, including: limited medical resources, unreasonable fears or concerns of patients (false sense) and prevention of exposure to ionizing radiation. It is important to be more selective when selecting patients for neuroradiological treatment, and in larger cases MRI can be used instead of CT because of the higher sensitivity for posterior fossa pathology. (3) Ideally, patients with acute dizziness require imaging. MRI is preferred over CT scan in the majority of cases. In certain cases, it is important to exclude bleeding prior to thrombolysis or to detect vertebral artery dissection using CT angiography. (4) The timing of MRI is also very important, because of the risk of false negatives in the first 48 hours. In some cases, it is necessary to perform a repeat MRI if the HINTS test results suggest a central process but the MRI results do not show any significance. (4) Imaging performed on our patient was a head-CT scan, which was performed at the time the patient was admitted to the emergency department, 5 hours of onset and found a suspected cerebellar infarction according to **Fig. 1**, then on the sixth day of treatment, the patient underwent MRI of the Head and was found to have infarction in the cerebellar region as per **Fig. 2** with Magnetic Resonance Angiography (MRA) results within normal limits. These imaging results support the diagnosis of acute vestibular syndrome in this patient.

The treatment of acute vestibular syndrome is based on treating acute stroke; however, because this is linked with intravenous thrombolysis, it must be modified to the time and severity of the disease according to the National Institute of Health Stroke Scale (NIHSS) when the patient arrives. (16) About 4% of patients with dizziness or vertigo and clinical symptoms indicative of a posterior circulation stroke arrive to the emergency room, but most have past the 4.5-hour time window for intravenous thrombolysis therapy. If the score is low in acute

vestibular patients, isolated vascular vertigo is not recommended for thrombolysis. Patients with an NIHSS score of more than four were evaluated for intravenous thrombolysis or urgent endovascular surgery. In the case of acute vestibular syndrome, conservative therapy will be effective. (16) Symptomatic therapy may be administered in the event of a labyrinth, cerebellum, or brainstem infarction. Exercise-based vestibular therapy is necessary as soon as feasible. There may be some improvement after therapy, but it is not usually complete. Patients with infarcts should be closely monitored to minimize brainstem compression caused by cerebellar edema. (17) The patient in our case report got symptomatic therapy for vertigo and dizziness in the form of Betahistine Hydrochloride 24 mg every 12 hours, however thrombolysis could not be done because it had been more than 4.5 hours from the beginning when the patient arrived at the neurology department.

Prognosis for Acute vestibular syndrome will improve with time and will necessitate vestibular therapy. (13) Because of central structural damage, dizziness or vertigo might linger for months. Patients may also have discomfort in their heads or eyesight, which may seem unsteady, as well as spontaneous nystagmus and impairment to the central vestibular and cerebellar circuits. (17)

Antihistamines betahistine hydrochloride 24 mg every 12 hours for 14 days, Acetyl Salicylic Acid 10 mg every 24 hours, Amlodipine 10 mg every 24 hours starting upon this fifth day after onset, Simvastatin 20 mg every 24 hours were prescribed to our patient as symptomatic treatment. On the tenth day, the patient's symptoms improved, and his vertigo was significantly reduced by around 50-60%, and his postural disturbances were reduced as well, allowing him to walk more steadily. The patient was then taught how to perform Cawthorne Cooksey vestibular therapy at home.

## CONCLUSION

Acute vestibular syndrome is closely related to the posterior circulation and can be caused by cerebellar infarction. Pathophysiology according to cerebral blood circulation disorders that occur. Clinical features of patients with cerebellar lesions may include vertigo, nausea and vomiting, horizontal nystagmus, limb ataxia or postural disturbances. The Bedside HINTS oculomotor examination is sensitive for acute vestibular stroke. Management Pharmacological therapy in the form of symptomatic and non-pharmacological in the form of vestibular rehabilitation. Investigations can be followed by CT or MRI of the head. The prognosis for acute vestibular syndrome is good.

**Acknowledgement:** None

**Conflict of Interest:** None

**Source of Funding:** None

## REFERENCES

1. Kim SH, Kim HJ, Kim JS. Isolated vestibular syndromes due to brainstem and cerebellar lesions. *J Neurol*. 2017;264:63–9.
2. Choi KD, Lee H, Kim JS. Vertigo in brainstem and cerebellar strokes. *Curr Opin Neurol*. 2013;26(1):90–5.
3. Ljunggren M, Persson J, Salzer J. Dizziness and the Acute Vestibular Syndrome at the Emergency Department: A Population-Based Descriptive Study. *Eur Neurol*. 2018;79(1–2):5–12.
4. Putra IBK, Adrian F. Dizziness dan Vertigo Dengan Keterkaitan Sistem Vertebrobasiler. *Callosum Neurol*. 2019;2(1):19–27.
5. Kim HA, Lee H. Recent advances in central acute vestibular syndrome of a vascular cause. *J Neurol Sci [Internet]*. 2012;321(1–2):17–22. Available from: <http://dx.doi.org/10.1016/j.jns.2012.07.055>
6. Diyan Anita Sari, Sri Sutarni IS. Stroke Iskemik Dengan Manifestasi Dizziness/Vertigo Terisolasi. *Neurona*. 2020;volume 37(2 Maret 2020):3–9.
7. Volgger V, Gürkov R. Acute vestibular syndrome in cerebellar stroke. *HNO*. 2017;65(07 march 2017):149–52.
8. John R. Hotson, M.D., And Robert W. Baloh MD. Acute Vestibular Syndrome. *N Engl J Med*. 1998;volume 339:9–14.
9. Banerjee G, Stone SP, Werring DJ. Posterior circulation ischaemic stroke. *BMJ*. 2018;361(April):1–7.
10. Kim SH, Park SH, Kim HJ, Kim JS. Isolated central vestibular syndrome. *Ann N Y Acad Sci*. 2015;1343(1):80–9.
11. Strupp M, Długaiczek J, Ertl-Wagner BB, Rujescu D, Westhofen M, Dieterich M. Vestibular disorders: Diagnosis, new classification and treatment. *Dtsch Arztebl Int*. 2020;117(17):300–10.
12. Chen L, Lee W, Chambers BR, Dewey HM. Diagnostic accuracy of acute vestibular syndrome at the bedside in a stroke unit. *J Neurol*. 2011;258(5):855–61.
13. Kerber KA. Acute Vestibular Syndrome. *Semin Neurol*. 2020;40(1):059–66.
14. Kattah JC, Talkad A V., Wang DZ, Hsieh YH, Newman-Toker DE. HINTS to diagnose stroke in the acute vestibular syndrome: Three-step bedside oculomotor examination more sensitive than early MRI diffusion-weighted imaging. *Stroke*. 2009;40(11):3504–10.
15. Choi JY, Lee SH, Kim JS. Central vertigo. *Curr Opin Neurol*. 2018;31(1):81–9.
16. Machner B, Choi JH, Neumann A, Trillenber P, Helmchen C. What guides decision-making on intravenous thrombolysis in acute vestibular syndrome and suspected ischemic stroke in the posterior circulation? *J Neurol [Internet]*. 2020;(0123456789). Available from: <https://doi.org/10.1007/s00415-020-10134-9>
17. Sri Sutarni, Rusdy Gazali Malueka AG. Bunga Rampai Vertigo. In: Wibowo S, editor. Yogyakarta: ugm pres. ugm.ac.id; 2018. p. 73–88.

How to cite this article: Lestari DT, Hidayati HB. Acute vestibular syndrome in cerebellar infarction: a case report. *International Journal of Research and Review*. 2021; 8(9): 29-35. DOI: <https://doi.org/10.52403/ijrr.20210906>

\*\*\*\*\*