Series: Advances in Health Sciences Research

Proceedings of the 3rd International Conference on Cardiovascular Diseases (ICCvD 2021)

PREFACE

Conference name: Proceedings of the 3rd International Conference on Cardiovascular Diseases (ICCvD 2021)
Date: 23-24 October 2021
Location: Sleman, Indonesia (Online)
Website: https://ic-cvd.uii.ac.id/

The 3rd International Conference on Cardiovascular Diseases October 23–24, 2021, in Universitas Islam Indonesia, Sleman Yogyakarta, Indonesia. Online using zoom by raising the theme cardiovascular disease (CVD) is the top cause of death globally. The World Health Organization (WHO) (2017) noted that CVD was responsible for 17.7 million deaths in 2015. CVDs include coronary heart disease (heart attack), cerebrovascular disease (stroke), elevated blood pressure (hypertension), peripheral artery disease, rheumatic heart disease, congenital heart disease, and heart failure (WHO, 2017). This non-communicable disease is expected to remain the main cause of death and to account for 23.3 million deaths worldwide by 2030.

About 80% of non-communicable diseases occur in low- and middle-income countries, including Indonesia, and 37% of these deaths are caused by CVD.

Integrated actions and strategies are needed to decrease the incidence of
Identification of the key factors driving CVD is crucial, and preventive act
is mandatory to decrease mortality and to limit the impact of morbidity
caused by CVD.

Complex factors can influence the effectiveness of strategies aimed at managing CVD in developing countries, and it is imperative to integrate ideas, knowledge, and strategies to address the burden of disease associated with CVD. The Faculty of Medicine Universitas Islam Indonesia is presenting the 3rd International Conference on Cardiovascular Disease as a forum for clinicians, researchers, lecturers, students, and policy makers to gather, share, and discuss the current information about managing CVD in developing countries. The overall theme of this event is “Multidisciplinary approaches to address the burden of cardiovascular disease in developing countries”.

The objectives of the conference are as follows.

To update knowledge about the relevant program priorities for addressing CVD burden in developing countries to explore options for the comprehensive management of primary cardiovascular risk factors such as high blood pressure, high blood glucose level, smoking, and sedentary lifestyle to discuss the latest guidance and evidence on the early detection and management of CVD and its implementation in the context of developing countries, including the impact of the COVID-19 pandemic on the management of CVD to strengthen interprofessional collaboration in addressing challenges using multidisciplinary approaches for the prevention, treatment, and rehabilitation of patients with CVD to update knowledge about health technology science and innovation related to the management and rehabilitation of patients with CVD.

Riana Rahmawati

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Peer-Review Statements

Heri Nurdiyanto, Isnatin Miladiyah, Nur Aisyah Jamil

Proceedings Article

The Effect of Diabetes Mellitus's Duration on Platelet Count and Mean Platelet Volume's Rat Stroke Model

Nabila Nabila, Rahma Yuantari, Ety Sari Handayani

Hiperglikemia in Type 2 Diabetes Mellitus (DM) have an impact on increasing the coagulation activity of the human homeostatic system. DM is a comorbidity of stroke. An increase of Platelet Count (PC) and Mean Platelet Volume (MPV) is useful for assessing the prognosis and severity of ischemic stroke....

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Cardiovascular Side Effects of Neuraminidase Inhibitors: A Review

Salsabila Zannuba Kurniawan, Riana Rahmawati, Fathiyatul Mudzkiroh, Muhammad Ariq Naufal Arofiq, Raden Muhammad Bagus Muliawan

Neuraminidase inhibitors are antiviral drugs prescribed especially for influenza types A and B. They inhibit the release of the viral neuraminidase protein, which facilitates viral release from the infected cell to the other host's cells. There has been an increasing use of these drugs during the COVID-19...

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How Does Metformin Work in the Treatment of Obesity? A Review

Muhammad Salman Shalahuddin, Riana Rahmawati

The rising prevalence of obesity is associated with a higher risk of developing cardiovascular diseases. Because it can induce weight loss, metformin, a long-used drug for treating diabetes, is used as an off-label medication for the treatment of obesity. However, the mechanism underlying this effect...

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Post Covid with Pleural Effusion: A Case Report

Ana Fauziyati, Bagus Andi Pramono, Untung Widodo

The Covid-19 pandemic has lasted for 1,5 years. There are many patients who suffered from many conditions or symptoms post Covid-19. In this report, we share our experience of caring for a post Covid-19 who suffered from worsening symptoms of breathlessness. Clinicians should be aware of post Covid-19...

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Correlation Between Hypertension and Mortality of Covid-19 Patient at Dr. Soehadi Prijonegoro Hospital

Muhammad Ulil Albab, Ana Fauziyati, Erlina Marfianti, Lulus Budiarto, Nurul Aini

Covid-19 pandemic has been spreading throughout the world for almost 2 years. Hypertension was one of the most common comorbidities among Covid-19 patients. We conducted this study to investigate the correlation between hypertension and mortality in Covid-19 patients. We collected 159 medical records...

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The Current Update on the Efficacy of Telmisartan in Patie with Hypertension: A Systematic Review

Angiesta Pinakesty, Rada Citra Saputra, Yuditya Anggraeni, Iin Novita Nurhidayati Mahmuda

Hypertension is a chronic condition which is often found worldwide and becomes a major risk factor for cardiovascular disease. Initial antihypertensive therapy with Angiotensin Receptor Blocker can be used for patients who have intolerance to Angiotensin-Converting Enzyme Inhibitors, such as telmisartan....

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Challenges in Management of Pediatric Rheumatic Heart Disease in Indonesia: A Narrative Review

Emi Azmi Choironi, Soeroyo Machfudz, Mohammad Bherbudi Wicaksono

Rheumatic heart disease (RHD) is heart valve(s) damage as a long-term complication of Acute Rheumatic Fever (ARF). The ARF is preventable and the global mortality of RHD has significantly decreased due to the treatment advances. However, with the increase of patients' survival rate, it causes more children...

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Exposure to Public Service Advertisements #suaratanparokok: A Sociodemographic Analysis

Rizanna Rosemary, Novi Susilawati, Sari Rahmani, Nur Anisah

The negative impact of cigarettes is on the health and socio-economic of individuals and the community. Cigarette advertising in mass media

contributes to an increase in smoking behaviour. The high number of cigarette consumption in the community raises concerns about the low l of public awareness...

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Night Eating Syndrome and Palatable Eating Motives Among Medical Students

Nur Aini Djunet

One of the night eating syndromes (NES) characters is night-time overeating. People with NES might have no control over the amount and kind of food. This could lead to excessive energy intake, hence causes overweight and obesity. We wanted to determine the prevalence of NES and association of NES with...

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Perception of Benefits and Barriers of Hypertension Prevention Behavior Through Audiovisual Health Education on Hypertension in Adolescents

Ratna Indriawati, Fadhil Abdillah

Hypertension or increased blood pressure is often referred to as the silent killer since it usually does not show significant signs and symptoms. Most sufferers do not realize that they suffer from hypertension. Based on Riskesdas data in 2007, the prevalence of hypertension in the population aged 18 years...

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Profile of Potassium Serum in Coronary Heart Disease (CHD)

Linda Rosita, Mahdea Kasyiva

Potassium level is closely related to the prognosis in several phases of a disease, especially in cardiovascular disease. Severe hypokalemia causes arrhythmia leading to cardiac arrest. Therefore, it is necessary to monitor potassium levels in patients with cardiovascular disease. This study aims to...

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Propolis Increases Brain Derived Neurotrophic Factor Expression in the Prefrontal Cortex of Rat Stress Model

Kuswati Kuswati, Ety Sari Handayani, Zainuri Sabta Nugraha

Stress causes an increase in glucocorticoid hormones and glutamat release in the central nervous system. This condition can increase calcium influx in the neuron, mitochondrial membrane permeability and triggers apoptosis, thereby reducing the number of neurons. In the prefrontal cortex, stress exposure...

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The Correlation Between Cardiometabolic Risks and High-Sensitivity C Reactive Protein (Hs-CRP) Levels in Serum Among Young Adults with Overweight and Obesity

Erlina Marfianti, Eko Andriyanto

Introduction: The prevalence of overweight and obesity in young adults is increasing worldwide, including in Indonesia. Previous studies have shown that obesity increases inflammatory factors and is closely related to the incidence of metabolic and cardiovascular diseases. Cardiometabolic risk factors...

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Determinants of Elevated Blood Pressure Among Young Adults in Indonesia

Vita Widyasari, Okti Ratna Mafruhah

Based on the results of the RISKESDAS 2018, the prevalence of hypertension in people aged > 18 years has increased from 25.8% (2013) to 34.1% (2018). Several factors, especially modifiable factors, need to be further identified to prevent an increase in blood pressure in young adults. The objective...

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Effects of Olive Oil Supplementation on Reducing the Risk of Cardiovascular Disease: A Scoping Review

Erlina Marfianti, Eko Andriyanto

Background The prevalence of cardiovascular disease is increasing in Indonesia. Cardiovascular disease ranks first among the causes of mortality in the world. Controlling the risk of cardiovascular disease becomes an effort to prevent the disease incidence. Previous studies have shown that olive oil...

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Long-Term Induction by Duck Egg Yolk Resulting in Increased Total Cholesterol, Low Density Lipoprotein, High Density Lipoprotein and Atherogenic Index in Experimental Animals

Muhammad Hanif Al As'ad Budiyanto, Dimas Agus Cholili, Diva Berliana Adhyaksa, Dwina Permatasari, Fathiyatul Mudzkiroh, Anindya Amanda Damayanti, Dwi Nur Ahsani

Induction by high-fat diet (HFD) is frequently performed for research on hypercholesterolemia in experimental animals. In general, HFD is obtained by combining various components, but only few studies have investigated the potential of each component to induce hypercholesterolemia in experimental animals....

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Utilization of Integrated Building Post for Non-communicable Disease Patients in Ngrampal District, Sragen Regency, Central Java, Indonesia

Adela Widi Etania, Rizky Rizani, Yusa Muhammad Thoriq, Leny Purnamasari, Wahyu Cipto Utomo, Pradhana Satria Pinandhita, Nengah Adnyana Oka Manuaba, Sani Rachman Soleman

Integrated Building Post (Posbindu) is a health-community resource-based to tackle non-communicable diseases provided by the Ministry of Health, Republic Indonesia. Application this program focuses on diabetes and hypertension in the population. However, community utilization to come to the Posbindu...

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Acute Limb Ischemia on Diabetic Patient: A Case Report and Literature Review

Achmad Bima Aryaputra, Hendry Purnasidha Bagaswoto, Taufiq Nugroho, Ana Fauziyati

It's estimated that 236.62 million people aged 25 years and older had peripheral artery disease around the world. Diabetes was also highly linked to PAD. Most likely due to neuropathy, patients with both diabetes and PAD have a rapid progression of their PAD. We report the case of a 58 years old woman,...

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Potential of Purple Corn Anthocyanin Extract as A Hypolipidemic Agent: An In-Silico Analysis

Isnatin Miladiyah, Satyo Nuryadi

Hyperlipidemia remains an important risk factor for cardiovascular diseases, including myocardial infarction and stroke. Some standard hypolipidemic drugs available in the market still do not meet expectations in lowering lipid levels. Investigation of alternative hypolipidemic agents continues to be...

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ST-segment Elevation Myocardial Infarction with Left Ventricle Thrombus: Case Report

Doharjo Manullang, Hadi Wijaya, Imran Soleh, Erwin Sukandi, Taufik Indrajaya

Acute myocardial infarction (AMI) occurs when there is evidence of myocardial injury (an increase in cardiac troponin values) and clinical evidence of myocardial ischemia. Data from the Jakarta Acute Coronary Syndrome Registry states that in 2014 there were 3015 patients with acute coronary syndrome...

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Total AV Block in Amyotrophic Lateral Sclerosis

Yudhie Tanta, Ali Ghanie, Andika Okparasta, Taufik Indrajaya, Erwin Sukandi

Bradyarrhythmia can be a life-threatening condition that mandates quick and proper responses and acts from a clinician. Furthermore, bradyarrhythmia management should not stop only in increasing the patient heart rate, but also to find the etiologies that caused this condition. Etiologies of bradyarrhythmia...

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The Effect of Community-Based Intervention on Controlling Blood Pressure for Hypertension Patient: A Systematic Review

Muhammad Luthfi Adnan, Miranti Dewi Pramaningtyas, Dini Islamiana

Hypertension is a significant risk factor for death caused by cardiovascular disease. Collaboration with the community through community-based intervention is one of the actions to reduce the incidence of hypertension. Although many community-based intervention studies have been carried out to treat...

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Patient Sociodemographic Characteristics and Adherence to Hypertension Medication: A Survey in a Rural Village in Indonesia

Alma Natasya, Riana Rahmawati

Hypertension has become a major global health problem and is one of the most important risk factors for cardiovascular events that can be prevented and treated. Medication adherence is important in hypertension management and can be influenced by various factors, including those related to patients and...

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Knowledge About Hypertension and Its Treatment Among Patients and Lay Health Workers in the Posyandu Lansia

Nida Zahrotun Nazihah, Riana Rahmawati

The size of the elderly population continues to increase. In Indonesia, hypertension often occurs in the elderly. Knowledge about hypertension plays a vital role in hypertension control. Posyandu lansia (Integrated Health Service Post for the Elderly) is a community program involving the active participation...

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The Effects of Subtotal Nephrectomy Method on Urea and Creatinine Serum in Hypertension Animal Model

Ernadita Budiastuti, Miranti Dewi Pramaningtyas

Chronic kidney failure is a disease that causes a decrease in kidney function in cleaning the blood of toxic materials, which causes accumulation of metabolic waste in the blood. Renal failure can cause severe azotemia and uremia. Subtotal nephrectomy is a method to induce hypertension and renal failure....

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A Rare Case Report: Waardenburg Syndrome

Mita Rahma, Nabila Nabila, Veby Novri Yendri

Hearing loss is one of the most common congenital disorders. Hearing loss in early childhood will impair speech and language development. Waardenburg syndrome (WS) is a rare genetic disorder characterized by sensorineural deafness associated with pigmentary anomalies and various defects on neural crest...

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Correlation Between Lipid Profile and Disease Severity in Psoriasis Patients of Dr. Sudirman Kebumen District Hospital Central Java Indonesia

Rosmelia, Evy Sulistyoningrum, Antonius Wibowo, Lamya Muthia Nabila, Bedry Qintha, Faris Ali Fauzi, Dina Esti Utami

Psoriasis is a chronic inflammatory disease characterized by skin inflammation, epidermal hyperplasia, increased risk of arthritis,

cardiovascular morbidity, and psychosocial challenges. Previous studies revealed the association of psoriasis with cardiometabolic diseases, in w dyslipidemia is a common...

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Effectiveness of Community Activities Restriction Enforcement Program in Handling COVID 19 Pandemic in Yogyakarta Province, Indonesia

Brain Novi Andri, Gea Sonia Amanda, Faris Ali Fauzi, Karmila Intansari, Endah Sri Puji Hastuti, Sani Rachman Soleman

Since the case, COVID 19 struck Indonesia on March 1st 2020. Some provincial governments have decided on micro policies based on national decisions, such as Community Activities Restriction Enforcement (PPKM). The aim of this study compared incidence COVID 19 in every regency in Daerah Istimewa Yogyakarta...

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Impact of the COVID-19 Pandemic on the Integrated Health Service Post for the Elderly Services

Mellody Yudhashinta Putri Cahyono, Riana Rahmawati

The ongoing global COVID-19 pandemic since March 2020 has increased the risk of morbidity and mortality in elderly people. The Integrated Health Service Post for the Elderly (IHSP-Elderly, Posyandu lansia) is a community-based program that provides large-group outdoor activities for the elderly. This...

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Increased D-Dimer in Covid-19 Patients: Article Review

Farida Juliantina Rachmawaty, Reza Ishak Estiko, Rana Aulia Farah Kamila

COVID-19, which was first discovered in Wuhan, China in December 2019, has infected more than 200 countries. The virus that causes it is the Severe Acute Respiratory Syndrome Corona Virus 2 or better known as SARS-CoV-2. Symptoms in infected individuals vary widely from asymptomatic to severe ones. Individuals...

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Stroke Prevention with Anticoagulant in Cardiovascular Problem: Focus in Atrial Fibrillation

Ismail Setyopranoto, Punik Mumpuni Wijayanti, Utami

Cardiovascular problems such as atrial fibrillation is a serious and growing health problem in the global community. The presence of atrial fibrillation increases the risk of stroke, which in turn has its own problems and impact. Data have shown that the use of warfarin reduces the risk of stroke in...

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The Potential of Nanoliposome-Encapsulated PCSK9 Vaccine for Active Immunization Against Atherosclerosis: A Review

Anindya Amanda Damayanti, Riana Rahmawati, Amany Taqiyyah Ward Raisa Kamila Putri, Zavia Putri Salsabila

Atherosclerosis, a chronic inflammatory disease characterized by lipoprotein deposition in the intima in arteries, is often diagnosed late. This fact has triggered research into immunization strategies for preventing the disease. This review discusses recent studies of immunization using proprotein convertase...

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SGOT Levels in Acute Myocardial Infarction Patients with Mayor Adverse Cardiovascular Events (MACE)

Iis Siti Aisah, Rahma Yuantari, Linda Rosita

SGOT is one of the most widely available biomarkers of myocardial infarction in various health care facilities in Indonesia. In the clinical course of acute myocardial infarction, major adverse cardiovascular events (MACE) may occur which include death, CHF, stroke, arrhythmia, and cardiogenic shock....

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Secundum Atrial Septal Defect Severe Pulmonary Hypertension in Pregnancy: A Case Report

Welly Oktaviandani, Nuswil Bernolian, Imran Soleh, Andi Wahyudi, Ahmat Umar, Ali Ghanie, Fredi Heru Irwanto, Erwin Sukandi, Taufik Indrajaya

Atrial septal defect (ASD) is the most common form of congenital heart disease. Left-to-right shunting leads to right ventricular (RV) volume overload with excessive pulmonary blood flow. In the absence of pulmonary

hypertension, pregnancy is generally well tolerated in the setting of an A This case...

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Plasmodium Vivax Malaria and Cardiac Complication

Fitria Siwi Nur Rochmah, Siti Istianah

Plasmodium vivax (P. vivax) is known as a benign pattern of malaria. In recent years, Plasmodium vivax can also cause severe malaria infection that contributes to various manifestations in human organs. Cardiac complications associated with P. vivax malaria are rarely seen, but have recently been reported....

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The Impact of Anxiety and Sleep Disturbances During COVID-19 Pandemic on Systolic and Diastolic Blood Pressures in a Rural Community

Rina Juwita, Erlina Marfianti, Ana Fauziyati

The COVID-19 pandemic, which has occurred since last year, has impacted all aspects of life, including health, in particular the condition of blood pressure. Many factors affect blood pressure during this pandemic, and hypertension is caused by many conditions. The pandemic has also affected the patterns...

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The Potential of Black Cumin SNEDDS (Self-nanoemulsifyi Drug Delivery System) on Total Cholesterol Level of Hypercholesterolemic Model Zebrafish (Danio Rerio)

Annisa Sofiana, Rizki Fajar Utami

Hypercholesterolemia is a risk factor for various cardiovascular diseases. This condition is marked by the increasing total cholesterol level higher than 200 mg/dL. Black cumin is one of the herbal plants which has the potential to be an antihyperlipidemic agent. Black cumin used in this research is...

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The Increase of Student Obesity Rates During Online Learning in Medical Students

Nur Aini Djunet

Obesity could increase the risk of cardiovascular diseases, and now it is the first comorbid for COVID-19. It occurs chronically because of the positive energy balance. Body mass index (BMI) is related to the amount of fat. This index can predict how the burden of obesity might affect everyone in the...

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Type 2 Cardiorenal Syndrome in Heart Failure with NSTEMI: A Case Report of 10 Months Follow Up

Achmad Bima Aryaputra, Dewi Hapsari Suprobo, Erlina Marfianti

Cardiorenal syndrome (CRS) is a disorder of the heart and kidneys whereby acute or chronic dysfunction in one organ may induce acute or chronic dysfunction of the other. Chronic abnormality in cardiac function leading to

kidney injury or dysfunction was a typical characteristic of CRS type 2. R dysfunction...

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Left Atrial Myxoma with Ischemic Stroke Complications: A Case Report

Muhammad Mukti, Susilawati, Fredi Heru Irwanto, Ahmat Umar, Bermansyah, Pinto Desti R, Erwin Sukandi, Ali Ghanie, Taufik Indrajaya

Cardiac myxoma is the most frequent primary tumor of the heart, considered a benign, slowly proliferating neoplasm. The incidence of cardiac myxoma is low, with approximately 0.5–1 cases per 1,000,000 individuals per year. Cardiac myxoma can be present at any age but most often in 30–60 years old, with...

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Potential Combination of Nigella sativa and Allium sativum as a Modality of Herbal Therapy in Dyslipidemia Cases: A Literature Review

Muhammad Hanif Al As'ad Budiyanto, Rizki Fajar Utami

Dyslipidemia is a condition of the lipid profile in the blood at an abnormal level. Based on the 2013 Riskesdas, about 35.9% of the Indonesian population aged >14 years experienced dyslipidemia. Black cumin is an herbal plant that through its antioxidant activity can cure diseases such as dyslipidemia....

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The Transmission Patterns of COVID-19 in the Academic Community: An Epidemiological Study

Pantes Irsa Mahendriyansa Putra, Dimas Adjie Yuda Mahendra, Iin Novita Nurhidayati Mahmuda

The COVID-19 pandemic is an ongoing problem in the world. The etiology of this disease is a group of coronaviruses that cause severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS CoV). This virus is still mutating and producing new variants that have the characteristics...

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Echocardiography Parameter-Left Ventricle Dimensions Profile on Congestive Heart Failure with or Without Hypertension and Old Myocardial Infarction

Muhamad Fahrurozi Asssidik, Tiara Ramadhani, Nanda Nurkusumasari

Heart failure (HF) is a global pandemic that affects at least 26 million people worldwide and its prevalence continues to increase. Heart failure (HF) is a clinical syndrome caused by structural and functional defects in the myocardium resulting in impaired ventricular filling or blood ejection. Echocardiography...

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Bayesian Approach to Comparing the Left Ventricular Volume in Myocardial Infarction and in Normal Cases

Aditya Tri Hernowo

Post-contrast delayed-enhancement MRI helps to show the extent of myocardial infarction (MI), as well as allowing the morphometric analysis of the heart structure, e.g., the left ventricular volume (LVV). Here the author showed how Bayesian implementation of statistical inference can benefit investigators...

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Rastelli Procedure in Tetralogy of Fallot Patient with Anomalous Coronary Artery: A Case Report

Achmad Aulia Rachman, Heroe Soebroto, Arief Rakhman Hakim, Erdyanto Akbar

Tetralogy of Fallot (ToF) is the most common form of cyanotic heart disease with a prevalence between 3,5 to 8%. Anomalous coronary artery is reported in 2–23% of ToF patient. Knowledge of the coronary anatomy prior to surgery was important to avoid injury to the vessel. In our case, ToF with the presence...

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Imaging Technology of CT Scan 128 Slice for Pulmonary Hypertension, Mitral Stenosis, Emphysema, and Pleural Effusion: Case Report

Lilik Lestari

CT Scan 128 Slice can produce excellent images with good contrast and low radiation dose. Pulmonary hypertension CT Scan is able to imaging central

arterial dilatation, while mitral stenosis on CT Scan 128 Slice imaging ca: seen as well. The purpose of this paper is to report the diagnosis of patier

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Correlation Between Hypertension and Cognitive Impairment in Elderly in Jatinom, Klaten

Fery Luvita Sari, Agus Taufiqurrohman, Hasna Dian Farida

Background: The elderly is prone to health problems such as geriatric syndrome, including cognitive impairment. One of the causes of cognitive impairment is vascular disorders such as hypertension. Although hypertension is not a contagious disease, the percentage of incidence in Central Java Province...

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Garlic (Allium sativum L.) Efficacy as an Adjuvant Therapy for Type 2 Diabetes Mellitus: A Scoping Review

Hafidz Abdullah, Isnatin Miladiyah

Type 2 Diabetes Mellitus (T2DM) is a chronic disease with increasing prevalence worldwide and causing many threatening life complications. Various alternative therapies continue to be developed to control blood sugar level in T2DM, including from tradisional plants. Garlic (Allium sativum L.) is a traditional...

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The Incidence and Prevalence of Stroke by Cause in Indonesia Based on Global Burden of Disease Study 2019

Vita Widyasari, Ferry Fadzlul Rahman, Valendryani Ningrum

Stroke is the world's second largest cause of mortality and the leading cause of disability. The report of incidence and prevalence of stroke by cause in Indonesia based on national population was limited. The objective of this study was to explore the incidence and prevalence of stroke and cause...

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Factors Related to Electrocardiogram Abnormality in Type 2 Diabetes Mellitus Patients

Ni Made Elva Mayasari, Ahmad Ghiffari, Ahmad Restu Iman, Rifa Salsabiila

One of the most common causes of mortality in patients with Diabetes Mellitus (DM) is cardiovascular disease. Electrocardiography (ECG) is considered as a screening technique for cardiovascular disease, particularly in individuals who have hypertension or are suspected of having cardiovascular disease....

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Physical Compatibility of Norepinephrine-Dobutamine with Common Medication in Critical Care: Visual and Microscopy Evaluation

Suci Hanifah

Intravenous (IV) incompatibility is one of the obstacles in achieving the intended therapeutic goals. Norepinephrine-dobutamine is common inot that often meet with other injections and somehow cause incompatibility risk. Aim: This study aims to evaluate the compatibility of norepinephrine-dobutamine...

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The Effects of Kefir and Jicama Synbiotic Administration on White Rat Serum Cortisol Levels After Subtotal Nephrectomy

Miranti Dewi Pramaningtyas, Rokhima Lusiantari, Titis Nurmasitoh, Ernadita Budiastuti, Qudsia Umaira Khan, Rafik Prabowo, Mohammad Alvian Subhakti, Hana Afifah Firdaus, Bagastyo Afif Prabowo, Chairun Nisa' Nur'aini, Silvi Rahmawati, Muhammad Hanif Al As'ad Budiyanto, Clarinta Belva Sabina, Salama Suci Nurani, Alzena Zada Nur Safira

Changes in the kidneys can lead to increased blood pressure, which can be followed by an increase in cortisol levels. Subtotal nephrectomy is one of the methods to provide animal models of hypertension. The combination of kefir milk and jicama as a synbiotic drink is expected to maintain cortisol under...

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The Incidence and Prevalence of Stroke by Cause in Indonesia Based on Global Burden of Disease Study 2019

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Abstract. Stroke is the world's second largest cause of mortality and the leading cause of disability. The report of incidence and prevalence of stroke by cause in Indonesia based on national population was limited. The objective of this study was to explore the incidence and prevalence of stroke and cause of stroke by province, sex, and age categories in Indonesia. The causes of stroke in Indonesia, including each province, were collected from the Global Burden of Disease study (GBD) 2019. The age-standardized incidence rates and age-standardized prevalence rates per 100,000 individuals with 95% Uncertainty Intervals (UIs) were used to estimate the incidence and prevalence characteristics. The cause of stroke was classified into three types: intracerebral hemorrhage, ischemic stroke, and subarachnoid hemorrhage. In 2019, the national incidence and prevalence of stroke in Indonesia were 293.33 (262.2 – 331.6 95% UIs) and 2,097.22 (1878.2 – 2351.8 95% UIs) per 100,000 individuals, respectively. East Kalimantan province holds the highest rank in the incidence rate of stroke and ischemic stroke as well as the prevalence rate for almost all types of stroke, except for subarachnoid hemorrhage, which Yogyakarta holds. Meanwhile, the highest incidence rates for intracerebral hemorrhage and subarachnoid hemorrhage were in the provinces of South Kalimantan and North Maluku, respectively. Females and over 70 years of age had a higher incidence and prevalence of stroke than other groups.

Keywords: Incidence rates · Prevalence rates · Stroke

1 Introduction

Stroke cases worldwide experienced a sharp increase between 1990 and 2019. The incidence of stroke increased by 70%, while the prevalence increased by 85%. The increase in death from stroke also increased by 43% and disability-adjusted life-years (DALYs) due to this cause increased by 32%. In 2019, stroke was the second-leading

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cause of death [1, 2] and the third-leading cause of combination death and disability worldwide. The prevalence and incidence rates of stroke are at 101 million and 12.2 million, respectively [1].

Stroke incidence is reported to be higher in middle-income countries than in high-income countries [2, 3]. It is critical to map cases in each region in order to gain an overview of the cases in that region. Around half of all stroke-related deaths are caused by inadequate intervention of modifiable risk factors, and thus could be avoided [3]. One of the factors that can help reduce stroke rates is lifestyle modification [4, 5]. Hopefully, by knowing that a particular area has a high stroke rate, more preventive measures can be implemented.

In Indonesia, the incidence and prevalence of stroke, especially by cause, were reported in a limited number of studies based on the national population. The aim of this study was to explore the incidence and prevalence rate of stroke, as well as the causes of stroke, in Indonesia by province, gender, and age group.

2 Method

This study is part of GBD 2019. The GBD team performed a systematic effort to estimate the levels and trends of burden caused by 369 diseases and injuries by gender, age, year (from 1990 to 2019), and location, which included 204 countries and territories. The eligibility criteria for GBD 2019, the literature search approach, and data extraction are all detailed elsewhere [6, 7]. We gathered information on the age-standardized incidence and prevalence rates of stroke in the Indonesian population. We describe the data collected based on the cause of stroke and present it by province. In addition, we conducted analyses based on gender and age group. All estimates were expressed in terms of rates per 100,000 individuals, with 95% Uncertainty Intervals (UIs). This study's data are available on the Global Health website (http://ghdx.healthdata.org). Map visualization created using the datawrapper application (https://www.datawrapper.de/).

The causes of stroke are categorized into intracerebral hemorrhage, ischemic stroke, and subarachnoid hemorrhage. The GBD team's operational definition for Stroke and its classification is based on WHO guidelines. Stroke was defined as the quick onset of clinical indications of (typically localized) disruption of brain function that lasted more than 24 h or resulted in mortality. Ischaemic stroke is a type of stroke that causes neurological damage due to a localized cerebral, spinal, or retinal infarction. Intracerebral haemorrhage is a type of stroke that occurs when there is a focused collection of blood in the brain that is not caused by trauma. Non-traumatic stroke caused by bleeding into the brain's subarachnoid area is known as subarachnoid haemorrhage [1, 8].

3 Result and Discussion

3.1 Incidence Rate Stroke by Province

In 2019, Indonesia's national stroke incidence rate was 293.3 (262.2–331.6 95% UIs) per 100,000 individuals. Ischemic stroke, intracerebral haemorrhage, and subarachnoid haemorrhage were sequentially the highest to lowest leading causes of stroke, in terms

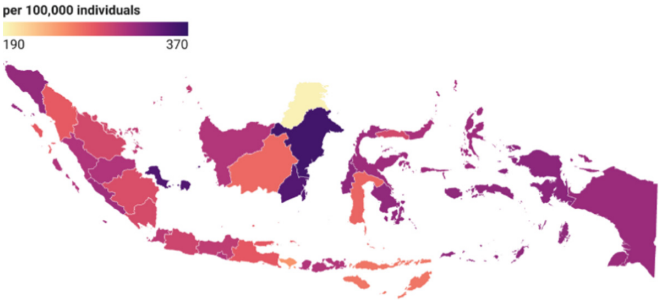

Fig. 1. Age-standardized incidence rate Stroke 2019

of prevalence. With 361.6 (319.9–410.0 95% UIs) and 195.0 (172.6–222.5 95% UIs) per 100,000 individuals, respectively, East Kalimantan had the highest and North Kalimantan had the lowest stroke incidence rates (Fig. 1). The highest and lowest incidences of intracerebral haemorrhage were 151.5 (129.1–176.8 95% UIs) per 100,000 individuals in South Kalimantan and 69.9 (59.4–82.2 95%UIs) per 100,000 individuals in North Kalimantan, respectively. Ischemic stroke incidence rate ranges from 112.4 (93.7–135.6 95% UIs) in North Kalimantan to 199.8 (166.0–243.9 95% UIs) per 100,000 individuals in East Kalimantan. The province of North Kalimantan had the lowest incidence of subarachnoid haemorrhage, with 12.7 (10.5–15.4 95% UIs), and North Maluku had the highest, with 17.2 (14.5–20.3 95% UIs) per 100,000 individuals (Table 1).

3.2 Prevalence Rate Stroke by Province

The national stroke prevalence rate in Indonesia was 2,097.2 (1878.1.2 – 2,351.8 95% UIs) per 100,000 individuals in Indonesia. East Kalimantan had the highest stroke prevalence rate (926.6 (769.5–1,090.1 95% UIs)) and North Kalimantan had the lowest (456.3 (380.0–535.0 95% UIs)) per 100,000 individuals, respectively (Fig. 2). East Kalimantan had the highest and North Kalimantan had the lowest prevalence of intracerebral haemorrhage, with 926.6 (769.5–1,090.1 95% UIs) per 100,000 individuals and 456.3 (380.0–535.0 95% UIs) per 100,000 individuals, respectively. The prevalence of ischemic stroke ranges from 1,032.7 (879.9–1,205.6 95% UIs) in North Kalimantan to 1,944.6 (1,640.4–2,307.1 95% UIs) in East Kalimantan per 100,000 individuals. East Nusa Tenggara had the lowest prevalence of subarachnoid hemorrhage, with 109.9 (91.4–132.4 95% UIs), while Yogyakarta had the highest, with 122.4 (102.6–147.1 95% UIs) per 100,000 individuals (Table 2).

3.3 Incidence and Prevalence Rate Stroke by Sex and Age

Stroke has a high incidence and prevalence rate, with women and people over the age of 70 bearing the brunt of the disease (Table 3). However, if the cause of the stroke is specified, the dominance shifts slightly. The majority of intracerebral hemorrhage, ischemic stroke, and subarachnoid hemorrhage cases were male, female, and nearly equal, respectively. The age group 70 years and older is the most common for all types of stroke, followed by the age group 50–69 years.

Table 1. Age-Standardized Incidence Rate Stroke By Cause In Each Province

Province	Stroke Rate per 100,000 (95% UI)	Intracerebral hemorrhage Rate per 100,000 (95% UI)	Ischemic stroke Rate per 100,000 (95% UI)	Subarachnoid hemorrhage Rate per 100,000 (95% UI)
Aceh	321.2 (287.3–363.8)	135.2 (115.0–157.0)	169.8 (141.2–204.9)	16.2 (13.6–19.2)
Bali	245.9 (219.1–277.5)	104.7 (88.8–122.9)	126.3 (104.9–152.7)	14.9 (12.5–17.8)
Bangka-Belitung Islands	352.8 (314.2–398.4)	148.4 (125.6–173.9)	188.7 (156.3–226.5)	15.8 (13.3–18.8)
Banten	301.7 (269.6–341.3)	126.3 (107.5–148.2)	159.3 (132.8–193.1)	16.1 (13.6–19.0)
Bengkulu	315.4 (282.2–354.5)	136.0 (115.7–158.9)	163.3 (136.7–196.5)	16.1 (13.6–19.1)
Central Java	300.2 (267.4–339.8)	122.3 (103.9–143.9)	162.0 (135.2–197.5)	15.8 (13.3–18.8)
Central Kalimantan	269.1 (238.8–303.6)	112.1 (95.2–131.5)	142.8 (119.5–172.3)	14.3 (12.0–16.9)
Central Sulawesi	317.2 (282.8–360.4)	138.9 (118.4–163.0)	162.4 (135.5–196.9)	15.9 (13.4–18.9)
East Java	278.7 (246.9–316.2)	113.4 (96.2–132.9)	150.6 (124.7–182.6)	14.8 (12.4–17.7)
East Kalimantan	361.6 (319.9–410.0)	145.9 (123.3–172.5)	199.8 (166.0–243.9)	15.9 (13.4–18.9)
East Nusa Tenggara	263.0 (235.5–298.2)	116.5 (98.3–137.2)	131.7 (110.4–159.3)	14.8 (12.5–17.7)
Gorontalo	290.5 (260.5–325.9)	127.8 (108.8–149.7)	146.8 (123.1–176.1)	15.9 (13.4–18.9)
Indonesia	293.3 (262.3–331.6)	119.4 (101.2–139.9)	158.7 (132.6–191.8)	15.3 (12.9–18.1)
Jakarta	297.5 (265.4–338.2)	104.2 (87.7–122.0)	179.0 (149.6–214.6)	14.3 (12.1–17.1)
Jambi	308.2 (273.8–349.2)	128.6 (108.9–150.4)	164.2 (137.1–195.9)	15.4 (13.0–18.3)
Lampung	288.7 (258.8–326.0)	118.5 (101.2–138.9)	154.4 (129.0–188.6)	15.8 (13.4–18.8)
Maluku	323.5 (289.6–362.5)	143.3 (121.7–168.2)	163.5 (137.2–196.5)	16.7 (14.1–19.8)

(*continued*)

Table 1. (*continued*)

Province	Stroke Rate per 100,000 (95% UI)	Intracerebral hemorrhage Rate per 100,000 (95% UI)	Ischemic stroke Rate per 100,000 (95% UI)	Subarachnoid hemorrhage Rate per 100,000 (95% UI)
North Kalimantan	195.0 (172.6–222.5)	69.9 (59.4–82.2)	112.4 (93.7–135.6)	12.7 (10.5–15.4)
North Maluku	317.1 (284.6–357.6)	140.9 (120.7–164.4)	159.0 (132.7–192.5)	17.2 (14.5–20.3)
North Sulawesi	311.4 (278.1–350.4)	132.3 (112.4–154.5)	163.5 (136.2–195.9)	15.7 (13.2–18.7)
North Sumatra	277.6 (247.4–313.8)	113.9 (96.9–133.5)	149.2 (124.7–180.4)	14.5 (12.3–17.2)
Papua	318.8 (285.2–359.2)	146.9 (124.8–171.7)	155.5 (129.5–188.4)	16.3 (13.8–19.6)
Riau	289.6 (258.6–327.4)	117.3 (99.6–137.8)	156.8 (130.6–190.4)	15.5 (13.1–18.4)
Riau Islands	300.5 (268.6–339.9)	120.0 (101.7–140.9)	164.6 (137.4–200.5)	15.9 (13.4–18.9)
South Kalimantan	351.5 (313.6–398.9)	151.5 (129.1–176.8)	184.0 (153.7–222.5)	15.9 (13.5–18.9)
South Sulawesi	271.7 (242.1–307.3)	112.7 (96.1–132.8)	144.7 (120.8–174.6)	14.3 (12.1–16.9)
South Sumatra	286.4 (255.6–325.6)	155.7 (98.2–135.9)	155.6 (130.2–188.4)	15.2 (12.8–18.1)
Southeast Sulawesi	322.4 (289.1–365.2)	139.9 (118.9–164.3)	165.7 (138.9–199.6)	16.8 (14.2–19.8)
West Java	293.0 (259.9–332.1)	111.6 (94.9–131.1)	166.4 (137.9–201.7)	14.9 (12.6–17.7)
West Kalimantan	307.5 (275.2–349.0)	131.7 (111.9–154.1)	159.9 (133.7–193.9)	15.9 (13.3–18.7)
West Nusa Tenggara	307.5 (274.5–343.9)	134.1 (114.0–156.6)	157.7 (131.4–188.3)	15.6 (13.1–18.6)
West Papua	325.3 (289.6–369.1)	139.3 (118.9–164.1)	169.4 (141.1–204.7)	16.5 (14.1–19.6)
West Sulawesi	324.3 (290.7–364.6)	146.2 (124.9–172.0)	161.8 (134.7–195.0)	16.3 (13.8–19.4)
West Sumatra	308.1 (275.1–346.1)	127.8 (108.8–149.9)	165.1 (138.3–198.4)	15.3 (12.9–18.2)
Yogyakarta	307.5 (274.9–346.5)	129.8 (110.5–152.0)	161.6 (134.9–194.4)	(13.6–19.2)

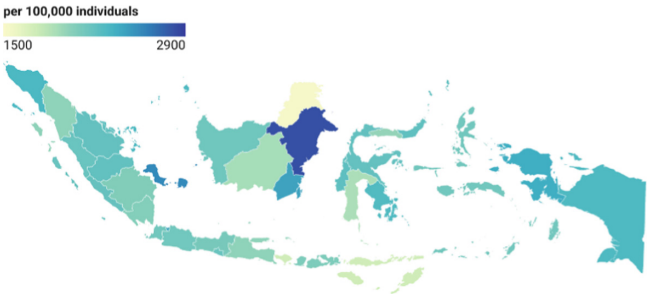

Fig. 2. Age-standardized prevalence rate Stroke 2019

Table 2. Age-Standardized Prevalence Rate Stroke By Cause In Each Province

Province	Stroke Rate per 100,000 (95% UI)	Intracerebral hemorrhage Rate per 100,000 (95% UI)	Ischemic stroke Rate per 100,000 (95% UI)	Subarachnoid hemorrhage Rate per 100,000 (95% UI)
Aceh	2,300.1 (2,045.5–2,582.2)	754.2 (628.7–886.1)	1,542.5 (1,319.2–1,817.7)	119.8 (100.3–143.7)
Bali	1,739.9 (1,553.5–1,951.2)	575.8 (480.4–674.1)	1,126.0 (950.1–1,340.2)	117.9 (98.9–141.6)
Bangka-Belitung Islands	2,564.0 (2,281.5–2,890.3)	837.7 (695.0–986.8)	1,748.7 (1,483.6–2,067.6)	114.6 (95.8–137.9)
Banten	2,130.6 (1,903.9–2,397.2)	687.6 (574.2–809.7)	1,426.6 (1,204.1–1,687.1)	119.9 (100.4–144.1)
Bengkulu	2,187.7 (1,946.8–2,479.3)	726.1 (604.4–860.0)	1,451.8 (1,231.3–1,713.1)	117.3 (98.0–140.4)
Central Java	2,097.2 (1,873.9–2,353.6)	671.9 (567.9–786.3)	1,406.0 (1,191.3–1,653.3)	120.9 (100.8–144.0)
Central Kalimantan	1,921.3 (1,713.7–2,165.2)	626.9 (527.5–734.2)	1,271.3 (1,083.8–1,506.7)	110.7 (92.3–132.9)
Central Sulawesi	2,202.2 (1,954.8–2,487.5)	754.1 (627.3–890.4)	1,442.5 (1,219.2–1,720.6)	113.7 (94.7–135.9)
East Java	2,001.9 (1,788.9–2,249.9)	638.5 (532.0–749.9)	1,341.2 (1,139.2–1,575.2)	116.1 (97.2–139.1)
East Kalimantan	2,821.2 (2,521.1–3,191.8)	926.6 (769.5–1,090.1)	1,944.6 (1,640.4–2,307.1)	115.8 (96.6–138.6)
East Nusa Tenggara	1,739.2 (1,551.3–1,958.3)	589.3 (493.3–697.2)	1,116.1 (944.1–1,313.5)	109.9 (91.4–132.4)

(*continued*)

Table 2. (*continued*)

Province	Stroke Rate per 100,000 (95% UI)	Intracerebral hemorrhage Rate per 100,000 (95% UI)	Ischemic stroke Rate per 100,000 (95% UI)	Subarachnoid hemorrhage Rate per 100,000 (95% UI)
Gorontalo	1,985.0 (1,775.5–2,229.5)	670.5 (558.3–787.2)	1,289.4 (1,093.4–1,514.3)	116.3 (96.8–141.3)
Indonesia	2,097.2 (1,878.1–2,351.8)	663.9 (557.1–777.1)	1,417.8 (1,210.3–1,667.9)	117.1 (98.3–140.4)
Jakarta	2,425.8 (2,185.8–2,732.5)	647.4 (547.1–756.3)	1,794.7 (1,524.2–2,108.9)	117.0 (98.5–140.3)
Jambi	2,207.2 (1,979.2–2,493.6)	710.2 (592.3–837.6)	1,492.5 (1,274.3–1,764.3)	115.0 (96.4–138.1)
Lampung	2,043.8 (1,828.3–2,292.7)	659.0 (552.3–777.2)	1,361.9 (1,151.6–1,604.3)	120.9 (101.3–144.9)
Maluku	2,131.3 (1,908.3–2,400.9)	715.6 (602.2–838.4)	1,402.6 (1,188.5–1,653.8)	115.6 (96.3–139.1)
North Kalimantan	1,536.2 (1,372.7–1,727.1)	456.3 (380.0–535.0)	1,032.7 (879.9–1,205.6)	113.9 (94.9–137.1)
North Maluku	2,130.7 (1,909.4–2,382.1)	734.4 (614.6–861.7)	1,375.4 (1,164.2–1,625.9)	119.8 (99.9–143.7)
North Sulawesi	2,212.0 (1,974.4–2,497.8)	721.5 (607.2–852.2)	1,485.2 (1,254.9–1,757.6)	116.3 (96.8–139.2)
North Sumatra	2,001.9 (1,788.9–2,244.4)	640.7 (536.6–752.2)	1,339.7 (1,138.8–1,570.7)	114.4 (95.7–138.1)
Papua	2,288.7 (2,054.6–2,564.3)	861.0 (719.7–1,009.2)	1,425.4 (1,205.4–1,681.2)	115.1 (95.9–137.9)
Riau	2,199.6 (1,962.8–2,481.3)	711.3 (601.8–834.4)	1,481.0 (1,253.5–1,748.2)	119.0 (99.5–142.9)
Riau Islands	2,290.6 (2,057.2–2,581.7)	718.7 (603.6–841.1)	1,571.2 (1,343.7–1,862.0)	121.2 (101.3–145.1)
South Kalimantan	2,434.6 (2,168.9–2,747.9)	805.1 (675.4–955.2)	1,643.7 (1,397.2–1,942.2)	112.9 (94.6–135.4)
South Sulawesi	1,895.5 (1,697.2–2,150.1)	600.3 (499.4–703.3)	1,271.6 (1,074.5–1,516.4)	110.6 (92.9–133.3)
South Sumatra	2,052.8 (1,832.0–2,308.7)	652.1 (542.1–764.6)	1,381.1 (1,166.6–1,624.5)	116.9 (97.4–141.1)

(*continued*)

Table 2. (*continued*)

Province	Stroke Rate per 100,000 (95% UI)	Intracerebral hemorrhage Rate per 100,000 (95% UI)	Ischemic stroke Rate per 100,000 (95% UI)	Subarachnoid hemorrhage Rate per 100,000 (95% UI)
Southeast Sulawesi	2,281.8 (2,048.9–2,564.8)	773.5 (646.3–912.9)	1,501.3 (1,275.2–1,762.4)	120.6 (100.5–145.3)
West Java	2,132.5 (1,903.8–2,401.5)	624.7 (524.0–735.7)	1,496.5 (1,270.6–1,771.8)	116.6 (97.6–140.6)
West Kalimantan	2,147.5 (1,927.7–2,419.9)	713.6 (601.1–837.8)	1,423.0 (1,207.2–1,694.6)	116.7 (96.9–140.3)
West Nusa Tenggara	2,068.6 (1,846.2–2,326.4)	686.2 (571.8–811.3)	1,369.5 (1,160.7–1,617.0)	111.5 (93.3–134.5)
West Papua	2,374.6 (2,114.9–2,665.6)	818.2 (680.7–973.8)	1,560.6 (1,325.9–1,838.3)	118.3 (98.9–141.9)
West Sulawesi	2,217.5 (1,982.0–2,510.2)	764.1 (645.8–895.7)	1,446.8 (1,221.3–1,723.1)	115.5 (96.5–139.3)
West Sumatra	2,175.1 (1,950.1–2,454.2)	698.5 (585.5–827.8)	1,468.1 (1,251.0–1,729.0)	115.3 (96.6–138.4)
Yogyakarta	2,174.7 (1,954.9–2,445.7)	707.1 (594.3–828.6)	1,454.1 (1,239.7–1,724.5)	(102.6–147.1)

Table 3. Age-Standardized Incidence and Prevalence Rate Stroke By Gender and Age Group

		Stroke Rate (95% UI)	Intracerebral hemorrhage	Ischemic stroke	Subarachnoid hemorrhage
Incidence					
Sex	Male	285.6 (255.7–323.2)	120.7 (102.9–141.9)	149.6 (124.1–180.1)	15.3 (13.0–18.2)
	Female	297.9 (265.3–337.1)	116.8 (99.1–135.1)	166.0 (139.4–201.3)	15.1 (12.7–18.0)
Age	Under 5 years	23.1 (14.7–34.0)	4.3 (2.3–7.1)	17.8 (10.5–29.0)	1.1 (0.5–2.0)
	5–14 years	20.4 (13.7–29.9)	7.4 (4.2–11.9)	11.3 (6.0–20.3)	1.7 (0.9–2.7)
	15–49 years	104.7 (87.2–123.3)	57.7 (43.5–73.4)	36.3 (26.7–48.8)	10.8 (8.5–13.5)
	50–69 years	741.2 (615.4–892.8)	309.1 (236.7–399.5)	394.4 (295.8–505.8)	37.7 (28.2–48.7)
	70+ years	1,825.7 (1,512.4–2,193.2)	623.9 (490.5–807.9)	1,144.5 (874.1–1,482.9)	57.3 (42.9–74.6)

(*continued*)

Table 3. (*continued*)

		Stroke Rate (95% UI)	Intracerebral hemorrhage	Ischemic stroke	Subarachnoid hemorrhage
Prevalence					
Sex	Male	1,960.6 (1,760.4–2,209.1)	700.7 (584.9–821.0)	1,239.1 (1,053.8–1,465.1)	112.4 (94.0–135.5)
	Female	2,208.9 (1,976.8–2,481.2)	629.7 (532.5–738.3)	1,567.9 (1,335.4–1,843.2)	120.3 (101.1–143.4)
Age	Under 5 years	4.5 (2.5–7.4)	7.6 (5.2–10.6)	31.1 (21.1–47.0)	1.9 (1.1–2.8)
	5–14 years	121.9 (88.3–165.1)	41.2 (28.8–56.2)	111.4 (76.9–156.6)	9.3 (6.1–13.7)
	15–49 years	965.8 (841.1–1,102.6)	421.9 (339.3–514.6)	485.2 (395.3–596.9)	89.5 (71.9–110.9)
	50–69 years	5,821.5 (5,068.4–6,720.2)	2,258.6 (1,811.2–2,807.2)	3,449.8 (2,788.9–4,244.9)	335.1 (266.2–424.5)
	70+ years	11,180.9 (9,117.7–13,623.5)	1,630.6 (1,217.1–2,158.7)	9,874.8 (7,654.5–12,603.7)	323.9 (235.4–427.0)

4 Discussion

This study demonstrated that the stroke prevalence and incidence in Indonesia were 293.33 and 2,097.22 per 100,000 individuals, respectively. The stroke prevalence from this study was higher compared to the global prevalence of 270 per 100,000 and USA prevalence of 260 per 100,000 in those over 20 years in 2017 [9]. Among countries in Asia, the number was also higher than the findings from Korea (159 per 100,000) and Thailand (185 per 100.000). However, the result was lower compared with China (719 per 100.000) and India (545 per 100,000) [10]–[13].

The WHO estimates are based on mortality data in which cerebrovascular disease is indicated as the cause of death [14]. Frequently, routine mortality statistics are the only data gathered on a national scale. While such data can offer a perspective of stroke trends and occurrence, numerous stroke studies were conducted in Indonesia, had determined that the validity of regular mortality stroke data was varying variable [15]. Data from the Ministry of Health showed that stroke prevalence in 2007 was 83 per 100,000 and risen to 121 per 100.000 in 2013, the prevalence of stroke in Indonesia has tended to rise [15, 16]. Stroke rates increased similarly in the majority of Asian countries, due to population aging and unhealthy lifestyles. Another plausible reason for the growing incidence is Indonesia's declining stroke death rate. This is unlikely to be the case with the Indonesian population, previous research has shown an increase in age-sex standardized mortality from 99 per 100.000 in 2002 to 193.3 per 100.000 in 2010 [17].

Stroke has considered being influenced by non-modifiable risk factors such as gender and age. This study discovered that females had a slightly greater stroke prevalence than males. This finding confirmed data from the American Heart Association, which indicated that generally, between 2011 and 2014, females had a stroke prevalence of 2.6 percent, which was greater than males 2.4 percent [9]. Indonesian data revealed a similar trend, with females and males experiencing a stroke prevalence was 12.1% and 12%,

respectively [15]. Moreover, it contradicted previous research findings indicating stroke was more frequent in males than females [18, 19]. In this study found that heritability of ischemic stroke and subarachnoid hemorrhage are higher in females than in males. Additionally, women face a greater lifetime risk than men due to the use of birth control tablets and pregnancy [20].

Age was a factor in causing chronic diseases including cardiovascular disease, cerebrovascular disease, and type 2 diabetes [21]. Age was a continuous risk factor for stroke, with the incidence and prevalence rates increased by a factor of two every five years beyond age 65 [22]. In this study found that incidence of stroke increased double after 50 years of age.

5 Conclusion

In Indonesia, the incidence and prevalence of stroke are quite high. Each province has a different number of cases, but the province of East Kalimantan requires special attention in stroke cases. Ischemic stroke is the most common type of stroke. Furthermore, women and people over the age of 70 are at a higher risk than other groups.

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