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OVERVIEW OF THE CAUSES OF AUTOPSIED SUDDEN DEATH AT PROF. DR. I.G.N.G. NGOERAH CENTRAL GENERAL HOSPITAL FOR THE 2014-2023 PERIOD

Ni Kadek Suras Febriyani Cawis[1*], Henky[2], Ida Bagus Putu Alit[2], Kunthi Yulianti[2]
Department of Forensic Medicine and Medicolegal Studies
[1.] Bachelor of Medicine, Faculty of Medicine, Udayana University
[2.] Department of Forensic Medicine and Medicolegal Studies, Faculty of Medicine, Udayana University
[*]e-mail: surasfebriyani@student.unud.ac.id

ABSTRACT

Sudden natural unexpected death is death due to disease process that occurs naturally. Sudden death due to illness has been increasing, with the cardiovascular system as the highest cause of death. While many causes of sudden death have been identified, some cases remain unexplained even after thorough examinations. Based on background, it is necessary to discuss the causes of sudden death. The study was conducted to determine causes and characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period. This study used a descriptive cross-sectional method with a retrospective study approach. Sampling was carried out using a total sampling technique, in which the number of samples was 82 bodies. Research data were obtained from secondary data in the form of postmortem examination reports in the 2014-2023 period. The study results showed that the causes of autopsied sudden deaths consisted of 69.5% sudden natural deaths due to disease and 30.5% sudden deaths of unknown causes. The elderly population or ≥60 years old dominated in these cases (39.0%). Most of samples who experienced sudden death were male (78.0%). In addition, about 91.5% of the samples were foreigners, and the highest BMI owned by the samples was obesity class I (34.1%). Autopsied sudden deaths were dominated by sudden natural deaths, with cardiovascular (80.7%), respiratory (5.3%), central nervous (5.3%), hepatobiliary (3.5%), immune (3.5%), and renal (1.8%) system diseases as the cause of death.

Keywords : autopsy, cause of death, characteristics, sudden death.

INTRODUCTION

Death is a phenomenon that can occur at any moment following the process of live birth and is characterized by the permanent cessation of all signs of life.[1] According to the World Health Organization (WHO), death is defined as a process involving irreversible cessation of physiological functions, confirmed explicitly by the permanent stoppage of cardiopulmonary activity.[2] Article 126 of the Indonesian Law No. 17 of 2023 on Health stipulates that an individual is declared dead if clinical or conventional diagnostic criteria are met in the form of the irreversible cessation of cardiovascular system functions and/or confirmation of brainstem death or complete brain death through established diagnostic evidence.[3]

Several terms related to the management of death included manner of death, cause of death, and mechanism of death. Manner of death is a description that tells how the death occurred and what events occurred around the death. Manner of death is categorized into natural death and unnatural death. Meanwhile, the cause of death is various diseases or injuries that cause the body to experience physiological disorders. Thus, the related individuals will experience death. The causes of death are classified by WHO into three types, namely immediate cause, intermediate cause, and underlying cause of death.[4] The mechanism of death is a physiological disorder due to disease or injury that causes death.[5]

Based on thanatology, the signs or changes that can occur after death are postmortem lividity, postmortem rigidity, changes in the eyes, and decomposition. Postmortem lividity or livor mortis occurs due to the force of gravity and the cessation of the heart pump. The following change is postmortem rigidity or rigor mortis, which will be related to biochemical processes in the form of Adenosine Triphosphate (ATP), which will be parsed into Adenosine Diphosphate (ADP).[4,6] In addition, changes in the eyes will occur after death, which is characterized by the loss of eye and corneal reflexes and the clouding of the transparent membrane of the eyes.[4] The decomposition of

the dead body will occur due to autolysis, which is also supported by the activity of microorganisms.[6]

Sudden natural unexpected death was described as a death resulting from a natural disease process.[5] According to the World Health Organization (WHO), sudden death refers to a type of death that occurs within 24 hours of the initial onset of signs and symptoms. Additionally, the Association for European Cardiovascular Pathology has characterized sudden death as a natural death occurring in a healthy individual or a patient with mild illness within six hours of symptom onset.[7] Sudden death is generally described as a case of death occurring without prior health complaints or symptoms, making its cause initially unknown. In forensic medicine, cases of sudden death without conclusive scientific evidence or definitive causes are categorized as unnatural deaths.[8] For this reason, autopsy procedures were performed to identify the scientific cause of sudden death, which was subsequently documented in a death certificate.[9]

Autopsy is defined as a surgical procedure performed on a deceased body to investigate or conduct medical examinations to assess the condition of internal organs and structures. Through this process, the cause of death can be identified, contributing to scientific knowledge or assisting in resolving criminal cases.[10] This postmortem examination is conducted to identify pathological characteristics or changes, thereby determining the cause of death.[11] According to Article 24, Verse (1) of the Indonesian Ministry of Health Regulation Number 38 of 2022 on Medical Services for Legal Purposes, the cause of death can be established through verbal autopsy, clinical autopsy or anatomical autopsy, and virtual autopsy.[12] Macroscopic and microscopic examinations must be conducted comprehensively and thoroughly during an autopsy.[13] The macroscopic analysis was found to identify the cause of death in 65–85% of sudden death cases.[14] When an autopsy is performed, all internal organ conditions related to the circumstances or cause of death must be described in detail.[15] The final result of a complete autopsy, encompassing both external and internal examination, is documented in a Visum et Repertum (V.e.R) report or a medicolegal report.[11,15]

The causes of sudden natural unexpected death were related to diseases of the body systems, including diseases of the cardiovascular, central nervous, respiratory, gastrointestinal, endocrine, and hematopoietic systems.[8] Recently, the incidence of sudden deaths caused by medical conditions has increased, with cardiovascular diseases identified as the leading cause of death.[16] Daş and Buğra (2022) reported that 87.9% of sudden deaths in young adults were attributed to cardiovascular diseases. Additional causes included pneumonia (9.1%), pancreatitis (1.5%), and peritonitis (1.5%).[17] In Indonesia, sudden deaths related to cardiovascular diseases are estimated to account for approximately 500,000 cases annually.[8] Furthermore, males are found to be four times more likely to experience sudden death than females due to higher prevalence of cardiovascular events in males.[9] The most vulnerable age groups for sudden death are adults and the elderly, with an age range between 40-60 years and >60 years.[18]

The causes of sudden natural unexpected death were well known. Nevertheless, there are still cases where the cause remains undetermined even after a complete and thorough autopsy. Sanchez et al. revealed that nearly 10% of sudden death cases cannot be explained despite comprehensive postmortem examinations.[19] Such cases necessitate further investigations to identify potential factors such as rare genetic disorders, exposure to unusual toxins, hazardous environmental conditions, or ingesting harmful food products.[20] Rare genetic disorders linked to sudden death included Brugada syndrome, which resulted from mutations in the SCN5A gene, and hypertrophic cardiomyopathy, which linked to mutations in MYH7, MYBPC3, and TNNT2 genes.[21,22] These genetic abnormalities can lead to cardiac arrhythmias, posing a significant risk for sudden death, even when the heart structure appears normal. As a result, conventional autopsy findings may fail to detect any pathological conditions in the heart. Thus, advanced forensic evaluations are needed.[22]

Based on these, this study is interested in investigating "Overview of the Causes of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014–2023 period". This study aimed to explore the causes and characteristics of autopsied sudden death cases. It will examine variables such as age classification, sex, citizenship, and Body Mass Index (BMI) to offer a comprehensive understanding of sudden death occurrences within the population.

OBJECT AND METHOD

This study was a descriptive cross-sectional study using a retrospective approach. Data were collected from secondary data, specifically the postmortem examination reports at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period. This study had the target population in the form of bodies at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital, while the accessible population in this study were autopsied bodies at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period. The research sample was taken using a total sampling technique with a sample size of 82 autopsied bodies due to sudden death at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital and met the inclusion criteria.

This study had inclusion criteria, namely the autopsied bodies at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period and the autopsied bodies due to sudden natural death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital. This study also had exclusion criteria, namely the bodies with the results of autopsy or post-mortem examinations that were incomplete and couldn't be read by researchers and bodies with alcohol levels, specifically ethanol and methanol that exceeded the lethal dose, namely >5,000 ppm or >500 mg/dL for ethanol and >200 ppm or >20 mg/dL for methanol.[23,24] This study was approved by the Ethics

Committee of the Faculty of Medicine, Udayana University, with the number 0321/UN14.2.2.VII.14/LT/2024.

The variables in this study were diseases of the body system as natural causes of sudden death, sudden death with unknown cause, age, sex, citizenship, and Body Mass Index (BMI). Secondary data collected will be computerized using computer software like Microsoft Excel. The data was analyzed descriptively to determine the frequency distribution of each variable. Data processing results are expressed in numbers and percentages in tables and narratives.

RESULT

A study regarding the overview of the causes of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period was carried out from February to November 2024, which took place at the Forensic Medicine Installation of Prof. Dr. I.G.N.G. Ngoerah Central General Hospital. The data gathered from postmortem examination reports included information about the causes of death and characteristics such as age, sex, citizenship, and Body Mass Index (BMI). The total number of samples that have met the inclusion criteria is 82 samples, which are then recorded and processed using a research worksheet in Microsoft Excel.

Overview of the Causes of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 Period

The overview of the causes of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period consists of natural causes of sudden death and sudden death with unknown causes. The data obtained by researchers related to the overview of the causes of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period are described in **Table 1**.

Table 1. Causes of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period

Causes of Sudden Death	Frequency (n)	Percentage (%)
Natural Causes of Sudden Death	57	69.5
1) Central Nervous System		
a. Bacterial meningoencephalitis and meningomyelitis, not elsewhere classified	1	1.8
b. Subarachnoid haemorrhage from intracranial artery, unspecified	1	1.8
c. Subarachnoid haemorrhage from middle cerebral artery	1	1.8
2) Cardiovascular System		
a. Acute myocardial infarction, unspecified	8	14.0
b. Atherosclerotic heart disease	22	38.6
c. Dissection of aorta [any part]	1	1.8
d. Endocarditis, valve unspecified	2	3.5
e. Hypertensive heart disease with (congestive) heart failure	2	3.5
f. Intracardiac thrombosis, not elsewhere classified	2	3.5
g. Mitral stenosis and tricuspid stenosis	2	3.5
h. Myocarditis, unspecified	2	3.5
i. Myocarditis, unspecified and acute pericarditis, unspecified	1	1.8
j. Rupture of cardiac wall without haemopericardium as current complication following acute myocardial infarction	4	7.0
3) Respiratory System		
a. Pneumonia, unspecified	3	5.3
4) Hepatobiliary System		
a. Acute viral hepatitis, unspecified	1	1.8
b. Other and unspecified cirrhosis of liver	1	1.8
5) Renal System		
a. Hypertensive renal disease with renal failure	1	1.8
6) Immune System		
a. Autoimmune thyroiditis	1	1.8
b. HIV disease resulting in mycobacterial infection	1	1.8
Sudden Death with Unknown Cause (Other ill-defined and unspecified causes of mortality)	25	30.5
Total	82	100.0

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Table 1 displayed that out of the 82 samples that met the inclusion criteria, 57 samples (69.5%) were classified as sudden natural deaths, and 25 samples (30.5%) were classified as sudden deaths with unknown causes. About 69.5% of sudden natural deaths, this study found that most of the sudden deaths were caused by cardiovascular system diseases (80.7%), followed by respiratory system diseases (5.3%) and central nervous system diseases (5.3%). The cardiovascular disease that ranks as the top cause of sudden natural deaths is atherosclerotic heart disease or coronary heart disease (38.6%).

Characteristics of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 Period Based on Age Classification

This study classifies age into infant, toddler, pre-school children, children, adolescents, adults, pre-elderly, and elderly. An explanation related to characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on age classification is stated in **Table 2.**

Table 2. Characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on age classification

Classification	Age Range (years)	Frequency (n)	Percentage (%)
Infant	0-1	1	1.2
Toddler	1-5	0	0.0
Pre-school children	5-6	0	0.0
Children	6-10	0	0.0
Adolescent	10-19	1	1.2
Adult	19-44	21	25.6
Pre-elderly	45-59	27	32.9
Elderly	≥60	32	39.0
Total		82	100.0

This study involved 82 samples, with the youngest age of the study sample being 4 months and the oldest age of the study sample being 89 years. Based on **Table 2**, it was found that the age classification that dominated the autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period, was the elderly population (≥60 years), which reached 32 samples (39.0%). Meanwhile, the age classification with the least population in the sudden death cases was the infant and adolescent populations, which amounted to 1 sample (1.2%).

Characteristics of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 Period Based on Sex

This study categorizes sex into male and female. The data obtained by researchers related to the characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on sex are described in **Table 3.**

Table 3. Characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on sex

Sex	Frequency (n)	Percentage (%)
Male	64	78.0
Female	18	22.0
Total	82	100.0

Table 3 indicated that only 18 females (22.0%) of 82 samples fulfilled the inclusion criteria. Most samples that experienced sudden deaths were dominated by males, which amounted to 64 samples (78.0%).

Characteristics of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 Period Based on Citizenship

An explanation of characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on citizenship is stated in **Table 4.**

Table 4. Characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on citizenship

Citizenship	Frequency (n)	Percentage (%)
South Africa	1	1.2
United States	5	6.1
Australian	30	36.6
Dutch	3	3.7
China	1	1.2
Denmark	1	1.2
Hungary	1	1.2
India	2	2.4
Indonesia	7	8.5
United Kingdom	7	8.5
Italy	1	1.2
Japan	1	1.2
Germany	3	3.7
Canada	4	4.9
France	6	7.3
Poland	1	1.2
Romania	1	1.2
Russia	3	3.7
Singapore	1	1.2
Sweden	1	1.2
Switzerland	1	1.2
Turkey	1	1.2
Total	82	100.0

Table 4 displayed that most of the samples in the autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period were foreigners, which amounted to 75 samples (91.5%). Meanwhile, samples that were Indonesian citizens in autopsied sudden death cases only amounted to 7 samples (8.5%). Additionally, Australian was the most common citizenship of the research sample with 30 samples (36.6%).

Characteristics of Autopsied Sudden Death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 Period Based on Body Mass Index (BMI)

This study categorizes Body Mass Index (BMI) into underweight, normal weight, overweight, obesity class I, obesity class II, and obesity class III. An explanation related to characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on Body Mass Index (BMI) is stated in **Table 5.**

Table 5. Characteristics of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period based on Body Mass Index (BMI)

Classification	Frequency (n)	Percentage (%)
Underweight	8	9.8
Normal Weight	20	24.4
Overweight	8	9.8
Obesity Class I	28	34.1
Obesity Class II	18	22.0
Total	82	100.0

Table 5 indicated that the Body Mass Index (BMI) classification most owned by samples in autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period is the obesity class I, which amounted to 28 samples (34.1%) and followed by the normal weight which amounted to 20 samples (24.4%). Meanwhile, the least Body Mass Index (BMI) classification owned by the sample in the autopsied sudden death was the underweight.

DISCUSSION

Based on this study, the overview of the causes of autopsied sudden death at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period consisted of 69.5% of cases with sudden natural death where the cause was identified, and 30.5% of cases where the cause of sudden death remained unknown. This finding aligns with a study conducted by Permatadewi and Yulianti (2017), which reported that 93.7% of sudden death cases at Sanglah Central General Hospital, Denpasar, during the 2009–2013 period were categorized as sudden natural deaths with identifiable causes, while only 6.3% of cases had unknown causes.[16] Sudden deaths with unidentified causes may occur due to rare hereditary diseases involving genetic mutations that trigger cardiac arrhythmias, which act as risk factors for sudden death despite a structurally normal heart.[20,22] Several rare hereditary diseases associated with genetic mutations included Brugada syndrome, which resulted from mutations in the SCN5A gene, and hypertrophic cardiomyopathy, which was linked to mutations in MYH7, MYBPC3, and TNNT2 genes.[21,22]

Among the 69.5% of samples classified as sudden natural deaths, this study identified cardiovascular diseases as the most common cause of death, accounting for 80.7%, followed by respiratory system diseases at 5.3% and central nervous system diseases at 5.3%. These findings align with the results reported by Suwu et al. (2021), which showed that 44.4% of sudden natural deaths at Prof. Dr. R. D. Kandou Central General Hospital, Manado, during the 2017–2019 period were caused by cardiovascular diseases, followed by respiratory system diseases (22.2%) and central nervous system diseases (22.2%).[9] However, these findings contrast with the study by Ismurrizal (2018), which reported that respiratory system diseases were the leading cause of sudden death at Dr. Pirngadi General Hospital, Medan, from 2013 to 2015 with a percentage of 67.5%, followed by cardiovascular diseases at 20.0%.[25] Despite the significant variations in findings across studies, most of the studies conclude that cardiovascular diseases were consistently identified as the predominant cause of sudden natural unexpected deaths.[9]

Cardiovascular diseases contributing to sudden natural deaths were predominantly caused by atherosclerotic heart disease or coronary heart disease, accounting for 38.6%, and followed by 14.0% of cases attributed to acute myocardial infarction. These findings are consistent with the study by Permatadewi and Yulianti (2017), which reported that ischemic heart disease (IHD) and acute myocardial infarction (AMI) were identified as the leading causes of sudden death at Sanglah Central General Hospital, Denpasar, during the 2009–2013 period, with respective percentages of 37.5% and 31.3%.[16] The variations in research findings have been associated with differences in each study sample's characteristics and contributing factors, such as genetic predispositions, environmental conditions, or lifestyle factors, which may influence the causes of sudden natural unexpected deaths in each study sample.[26]

In addition to investigating the causes of autopsied sudden death, this study also examined the characteristics of autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period, which included age, sex, citizenship, and Body Mass Index (BMI). Based on age classification, this study determined the total cases of autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period increased with advancing age, with the lowest cases observed in the infant (1.2%) and adolescent (1.2%) population. The findings of this study revealed an upward trend in sudden death cases among adults (19–44 years), pre-elderly individuals (45–59 years), and the elderly (≥60 years), with respective percentages of 25.6%, 32.9%, and 39.0%. These results align with the study by Ijtihadi et al. (2023), which revealed a significant correlation between age and sudden death,

demonstrating that the prevalence of sudden death cases increases with advancing age.[27] This trend has been associated with the deterioration of organ function, including cardiovascular, pulmonary, hepatic, and renal functions, that occurs with aging. This deterioration places individuals at a higher risk of developing diseases and increases their vulnerability to drug side effects, toxins, and environmental changes.[28]

Based on sex, the findings of this study revealed that autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period were more common in males (78.0%) compared to females (22.0%). These results align with the study by Suwu et al. (2021), which found that males experienced 88.9% of sudden death cases and only 11.9% of sudden death cases at Prof. Dr. R. D. Kandou Manado Central General Hospital for the 2017-2019 period were experienced by female.[9] Sudden deaths, which are more often experienced by males, can be attributed to the influence of unhealthy lifestyles, such as smoking and drinking alcohol; also, males are more at risk for cardiovascular disease as one of the diseases that cause sudden death.[29,30] In contrast, the female population is at lower risk of sudden death due to the presence of the cardioprotective hormone estrogen, which can reduce the risk of cardiovascular disease, maintain blood vessel elasticity, and also improve blood circulation in females.[31–33]

Based on citizenship, this study found that the samples of autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period were dominated by foreigners, with a percentage reaching 91.5%, and only 8.5% of the samples were Indonesian citizens. In addition, this study also revealed that Australian was the most common citizenship of the research samples, with a percentage reaching 36.6%. This finding aligns with a study conducted by Permatadewi and Yulianti (2017), where the study showed that 81.2% of samples in sudden death at Sanglah Central General Hospital, Denpasar, during the 2009–2013 period were foreigners with the percentage of research samples that had Australian citizenship reaching 43.8%. Only 18.8% of the research samples were Indonesian citizens.[16] The low number of Indonesians who experienced sudden death is associated with the low rate of autopsy implementation in sudden death cases in Indonesia as a result of the Indonesian people who still consider the aspects of religion and belief, the influence of emotional factors such as sadness and fear because it can torment the deceased, as well as cultural reasons and respect for the deceased.[34]

The high number of Australians who experienced sudden death in Indonesia was influenced by the high number of Australian tourists visiting Bali. Data obtained by Statistics Indonesia, known in Indonesia as Badan Pusat Statistik (BPS) of Bali Province, shows that foreign tourists who come directly to Bali based on their citizenship are dominated by Australians with a total of 8.7 million visitors from 2014-2023.[35] Australian tourists contribute almost 20% of total foreign tourist visits to Bali, with an average growth of 14% annually.[36] The study conducted by Ramadanti (2017) found that Australian tourists choose to visit Bali for several reasons, such as cheap travel or accommodation costs, relatively fast travel time by air transportation (around 3-7 hours), and the uniqueness of Bali Island, which makes Australian tourists feel comfortable visiting Bali.[37] Given that Australian tourists rank first as foreign tourists visiting Bali from 2014-2023, Australian tourists who may experience sudden death in Bali can be more in number when compared to other foreign tourists.

Based on Body Mass Index (BMI), the BMI classification most owned by the sample in autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period was the obesity class I, with a percentage that reached 34.1% and followed by the normal weight category with the percentage of 24.4%. If the percentage of BMI results in the overweight, obesity class I, and obesity class II classifications are accumulated, then the percentage of the three classifications (65.9%) will exceed the percentage of normal weight (24.4%). These findings align with a study conducted by Suwandono et al. (2019), which revealed that the BMI classification most owned by samples in cases of sudden death at Dr. Sardjito Central General Hospital in the 2011-2015 period was overweight or BMI more than 23.0 (82.25%) and followed by the normal weight (14.52%). Research by Suwandono et al. (2019) also demonstrated that overweight samples had a 13.05 times higher risk of cardiovascular disease, which has been recognized as a major contributor to cases of sudden death.[38] Being overweight is associated with increased fat mass and dysregulation of fat cells that can cause various clinical diseases, such as disrupting body metabolism and increasing the risk of cardiovascular disease.[39]

CONCLUSIONS AND SUGGESTIONS

Autopsied sudden deaths at Prof. Dr. I.G.N.G. Ngoerah Central General Hospital for the 2014-2023 period were dominated by sudden natural deaths, caused by the cardiovascular, respiratory, central nervous, hepatobiliary, immune, and renal system diseases as the cause of death. Based on age classification, autopsied sudden deaths have increased in the adult population, pre-elderly population, to the most proportion in the elderly population. Based on sex, autopsied sudden deaths were more frequently observed in males. Based on citizenship, most of the autopsied sudden death samples were foreigners with Australian being the most common citizenship. Based on Body Mass Index (BMI), autopsied sudden deaths mainly occurred in samples with obesity class I and followed by the normal weight.

The researchers acknowledge that this study has limitations. Thus, future research should use analytical methods to determine the relationship between sudden death and several variables, such as diseases in the body system, age, sex, and Body Mass Index (BMI). Furthermore, additional studies might be possible to conduct with a larger sample size and a broader research area.

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