CORRELATION BETWEEN GENDER, COMORBID HEART ILLNESS AND DIABETES MELLITUS TOWARD COVID-19 PATIENTS WITH THE RISK OF DEATH AT THE REGIONAL HOSPITAL OF SUKADANA 2021

Yuli Widiarti[1), Iis Tri Utami[2)
[1]Health Faculty, Aisyah University of Pringsewu, Street of A. Yani No. 1 A Tambak Rejo, Wonodadi, Pringsewu, Pringsewu regency, Lampung, Indonesia 35372. Telp: (0729) 7081587
email: yuliwidiarti51@gmail.com
[2] Health Faculty, Aisyah University of Pringsewu, Street of A. Yani No. 1 A Tambak Rejo, Wonodadi, Pringsewu, Pringsewu regency, Lampung, Indonesia 35372. Telp: (0729) 7081587
Email Corespodensi: jannatunnaim892@gmail.com

ABSTRACT

There are 10.789.441 cases of positive Covid-19 in the world and 4,860,500 deaths. On July 28th, 2021, the Indonesian government reported 3.287.727 confirmed cases of Covid-19, 88.659 deaths. The number of confirmed COVID-19 patients in Lampung Province on July 28th, 2021, there were 34.089 cases and 2076 deaths. In East Lampung, the number of confirmed cases was 3.675 cases and 242 cases died. The research objective was to determine the correlation between gender, comorbid heart disease and diabetes mellitus toward Covid-19 patients with the risk of death at Regional Hospital of Sukadana 2021. This type of research was quantitative and it used retrospective cohort approach. The population of all Covid-19 patients who were treated at the regional hospital of Sukadana, East Lampung Regency in 2020-2021, while the samples taken were 170 people. Collecting data used secondary data, namely medical record data for Covid-19 patients in 2020-2021, measuring instruments in the form of a check list, measuring methods by observation and statistical tests used the chi square test in a retrospective cohort design. The results showed that there was a correlation between gender (p: 0.020), comorbid heart disease (p: 0.016) and comorbid diabetes mellitus (p: 0.000) in Covid-19 patients with the risk of death in regional hospital of Sukadana 2021. It is also known that the male gender, diagnosed with heart and diabetes mellitus is a risk factor for death in covid-19 patients at regional hospital of Sukadana 2021. Suggestions to the government and community services to continue for monitoring and evaluate patients who have been declared negative for Covid-19.

Keywords: Covid-19, gender, heart disease, diabetes mellitus, risk of death

INTRODUCTION

The World Health Organization says that coronavirus disease was first discovered in Wuhan, China under the name novel coronavirus 2019 (2019-nCoV) caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). According to WHO, the number of positive cases in the world continues to increase. The latest data on July 2nd, 2020 there were 10.789.441 cases of Covid-19. According to that number, 5.928.941 were reported to have recovered. And the first number of country with the most distribution is in the United States (WHO, 2020).

Singapore has the highest number of positive corona cases in Southeast Asia. The total data on the positive number of the corona virus in Singapore as of April 20th, 2020, reached 8.014 people, for patients

who recovered 768 people. However, the number of positive Covid-19 deaths since the first case on March 21, was recorded at only 11 people. In second place, there is Spain, where 200,210 positive cases of corona were found. With cases of death as many as 20.852 patients. Third is Italy, then France, and fifth is Germany. But in Germany, the death rate is quite small compared to the number of cases found. Total positive cases 145.743, patients who died 4.642. This figure is even far below the UK, which has 120.067 positive cases, but the death toll is 16.060, four times higher than Germany (Worldometers, 2021).

Indonesia first reported a positive case of Covid-19 on March 2nd, 2020 and the number of cases of Covid-19 continues to increase. On July 28th, 2021, the Indonesian government reported 3.287.727 confirmed cases of Covid 19.88.659 deaths and 2.640.676 recovered cases from 510 districts across 34 provinces. The risk of complications from Covid-19 is higher in some vulnerable populations, especially patients, individuals who suffer from weakness, or who have multiple anxiety conditions (De Caprio et al., 2020).

Deaths in Covid-19 patients with comorbid heart disease and Diabetes Mellitus continue to increase. Vietnam and Thailand are the countries that have recorded the highest number of cases of Covid-19 and the number of deaths due to the Covid-19 virus in Southeast Asia. In Indonesia, the death rate due to Covid-19 reached 49.4 percent (National Covid-19 Handling Task Force, 2021). The percentage of deaths of Covid-19 patients in Lampung Province is still dominated by patients with the highest comorbid conditions causing death: Hypertension (31.3%), Diabetes Mellitus (18.8%), Heart Disease (18.8%). On August 1st, 2021, it was reported that the death toll increased by 96 people, this addition occurred in several districts in Lampung Province (East Lampung Regency Covid-19 Handling Acceleration Task Force, 2021)

Chronic heart disease and diabetes mellitus, acute inflammation and decreased organ function (heart, kidney, liver, and hematology) experienced by patients at the beginning of treatment can increase the risk of death due to Covid-19 infection (Yang & Yan, 2020).

Comorbid heart disease, hypertension and diabetes mellitus, male gender, and active smoking are risk factors for Covid-19 infection. Heart and Diabetes Mellitus are two non-communicable diseases with the number of sufferers increasing every year. These two diseases are incurable but can be controlled with treatment. This disease is a comorbid or comorbid disease that increases the risk of death of Covid-19 patients (Rifiana & Suharyanto, 2020).

Risk factors are divided into risk factors that cannot be changed such as age, gender, race, ethnicity, genetics including the presence of serious cases of pneumonia whose etiology has not been identified previously. Meanwhile, changeable risk factors are unhealthy behavior that causes comorbid diseases such as hypertension, diabetes, cardiovascular disease, lung disease (WHO, 2020).

Identification of Gender, Comorbid Heart Disease and Diabetes Mellitus in Covid 19 Patients which are risk factors for death at Sukadana Hospital. This research is very useful in determining the risk factors for death in Covid-19 patients so that efforts to prevent and control Covid-19 can be carried out. Based on this, it is necessary to determine what factors are associated with the risk of death in Covid-19 patients.

RESEARCH METHODS

This type of research was quantitative with a retrospective cohort approach. The population of all Covid-19 patients who were treated at the regional hospital of Sukadana in East Lampung Regency 2020-2021, while the samples taken were 170 people. The sampling technique used consecutive sampling. Data collection used secondary data, namely medical record data for Covid-19 patients in 2020-2021, measuring tools in the form of a check list, measuring methods by observation. Data analysis in the test used the chi square test in a retrospective cohort design.

RESEARCH RESULT

Table 2
Distribution of Variable Frequency in Covid-19 Patients at the Regional Hospital of Sukadana 2021

Variables	f	%
Age		
<50 year	70	41.2
≥50 year	100	58.8
Marital Status		
Married	152	89,4
Not married yet	18	10,6
Work		
Doesn't work	14	8.2
Student	3	1.8
Civil servant	18	10.6
Employee	10	5.9
Self-employed	33	19.4
Farmer	34	20.0
Trader	3	1.8
Laborer	3	1.8
Housewife	52	30.6
Gender		
Male	61	35.9
Female	109	64.1
Heart Comorbid Illness		
Diagnosed with Heart	49	28.8
Undiagnosed with Heart	121	71.2
Heart Comorbid Diabetes Mellitus		
Diagnosed with DM	40	23.5
Undiagnosed with DM	130	76.5
Incidence of Covid-19		
Died	27	15.9
Survive	143	84.1
Total	**170**	**100**

The frequency distribution in the age variable was the most in the age category > 50 years, namely 58.8% (100) patients, the most marital status in the married category was 89.4% (152) patients and the most occupation was the housewife category, namely 30, 6% (52) patients. The frequency distribution of the gender variables of the patients were 61 patients (35.9%) and women were 109 patients (64.1%). The variable of heart comorbid disease was 49 patients (28.8%) diagnosed with heart disease and 121 patients (71.2%). The comorbid diabetes variables diagnosed with DM were 40 patients (23.5%) and 130 patients (76.5%). The variable incidence of COVID-19 was 27 patients (15.9%) and 143 patients (84.1%).

Table 3

Correlation between gender, comorbid heart disease and diabetes mellitus toward Covid-19 patients with the risk of death at Regional Hospital of Sukadana 2021

Variables	Kejadian Covid-19				TOTAL		P-value	RR CI-95%
	Died		Survive					
	n	%	n	%	n	%		
Gender								
Male	15	24,6	46	75,4	61	100	0,020	2.234
Female	12	11,0	97	89,0	109	100		(CI 95% : 1.119- 4.459)
Heart Comorbid Illness								
Diagnosed with Heart	13	26,5	36	73,5	49	100	0,016	2.293
Undiagnosed with Heart	14	11,6	107	88,4	121	100		(CI 95% : 1.164- 4.517)
Heart Comorbid Diabetes Mellitus								
Diagnosed with DM	14	35,0	26	65,0	40	100	0,000	3.500
Undiagnosed with DM	13	10,0	117	90,0	130	100		(CI 95% : 1.797- 6.816)
Total	27	15,9	143	84,1	170	100		

DISCUSSION

1. **Correlation Between Gender in Covid-19 Patients and the Risk of Death at the Regional Hospital of Sukadana**

Based on the results of the research of the correlation between gender in Covid-19 patients and the risk of death, it was found that of 170 Covid-19 patients from 61 male Covid-19 patients, 24.6% (15) patients died, while from 109 Covid-19 patients of the female, there were 11.0% (12) patients who died, with p value = 0.016 < (0.05) then Ho was rejected and Ha was accepted, which means that there is a correlation between gender with the risk of death in regional hospital of Sukadana 2021.

Differences in hormone levels between men and women are theorized to be the reason why men are more prone to death. Through its immune modulating effects, estrogen has a positive effect on the female immune system to fight infection. Higher expression of ACE2 receptor levels is also theorized to play a role in increasing the COVID-19 viral load in the male population.

The results of this research are in line with research (Nawawi et al., 2021) which concluded that the odds of men who were positive for Covid-19 to recover were 0.75 times compared to the odds of women who were positive for Covid-19 to recover. The results of this research are also in line with studies conducted by (Noor & Islam, 2020). In their meta-analysis, the mortality risk of men was 1.63 (1,431.87) times higher than that of women. The results of this research are in line with research (Drew & Adisasmita, 2021) which states that male sex increases the risk of mortality compared to women (RR 2.15, 95% CI: 1.47 - 3.14).

From the statistical test of the correlation between gender and the risk of death, the RR value was 2.234 (95% CI: 1.119-4.459), which means that male Covid-19 patients have a 2.234 times greater risk of suffer the risk of death compared to male patients than woman.

The results of this research are in line with those carried out by Noor and Islam quoted from research (Drew & Adisasmita, 2021) with the title Symptoms and comorbidities that affect mortality of Covid-19 positive patients in East Jakarta, March-September 2020 said in their meta-analysis study, the mortality risk of males is 1.63 (1.43-1.87) times higher than that of females. Differences in hormone levels between men and women are theorized to be the reason why men are more prone to death. Through its immune modulating effects, estrogen has a positive effect on the female immune system to fight infection. Higher expression of ACE2 receptor levels is also theorized to play a role in increasing the Covid-19 viral load in the male population.

2. **Correlation Between Comorbid Heart illness in Covid-19 Patients and the Risk of Death at the Regional Hospital of Sukadana**

The results of the research of the correlation between heart comorbid disease and the risk of death showed that of the 49 Covid-19 patients diagnosed with a heart, 26.5% (13) patients died, while from 121 Covid-19 patients who were not diagnosed with a heart, there were 11.6%. 14) patients who died, with p value = 0.016 < (0.05) then Ho was rejected and Ha was accepted, which means that there is a correlation between comorbid heart illness and the risk of death in Regional Hospital of Sukadana 2021.

This is because heart disease is higher in severe disease with some clinical symptoms of Covid-19, such as fever, cough, and mild shortness of breath. Therefore, comorbidities greatly exacerbate the symptoms of Covid-19 infection. Covid-19 patients can lead to higher mortality rates and shorter survival for patients with comorbidities.

The results of this research are in line with a study (Sri Astuti, 2021) entitled Analysis of the correlation of Comorbidities (Comorbid) with the severity of Covid-19 symptoms: Literature Review From which concluded that heart comorbidities are very at risk of increasing Covid-19 symptoms. The results of this research are also in line with research (Drew & Adisasmita, 2021) which states that a history of CKD was also found to increase the risk of mortality up to 3.33 (1.27-8.68) times higher.

The correlation between comorbid heart illness and the risk of death obtained an RR value of 2.293 (95% CI: 1.164-4.517), which means that Covid-19 patients diagnosed with heart disease have a 2.293 times greater risk of suffer the risk of death compared to patients who are not diagnosed with heart illness.

The results of this research are in line with research (Willim et al., 2020) entitled Impact of Coronavirus Disease 2019 on the Cardiovascular System which explains that patients with cardiovascular comorbidities are at higher risk of experiencing more severe manifestations if infected with Covid-19. Although predominantly respiratory clinical manifestations, Covid-19 can also cause severe cardiovascular disorders. Angiotensin converting enzyme 2 (ACE2) acts as a SARS-CoV-2 receptor. It is suspected that patients with cardiovascular disease may have more severe clinical manifestations due to the higher ACE2 expression in this population. Cardiovascular complications of COVID-19 can include myocardial injury, myocarditis, acute myocardial infarction, acute heart failure, thromboembolism, and arrhythmias. In patients with cardiovascular comorbidities, optimization of conservative medical therapy should be prioritized. Emergency intervention measures may be considered in selected cases with hemodynamic instability.

3. **Correlation Between Diabetes Comorbid Diseases in Covid-19 Patients and the Risk of Death at the Regional Hospital of Sukadana**

The results of the research of the correlation between comorbid diabetes mellitus and the risk of death showed that from 40 Covid-19 patients diagnosed with DM, 35.0% (14) patients died, while from 130 Covid-19 patients who were not diagnosed with DM there were 10.0%. (13) patients who died, with p value = 0.000 < (0.05) then Ho was rejected and Ha was accepted, which means that there is a correlation between comorbid diabetes mellitus and the risk of death in Regional Hospital of Sukadana 2021.

Diabetes mellitus is a disease of carbohydrate metabolism disorders caused by the failure of the pancreas gland to produce the hormone insulin. This condition causes high blood sugar levels, it lasts chronically or over a long period of time, then it can cause a decrease in the function of white blood cells or leukocytes. However, in general, the severity of Covid-19 symptoms will be easier for patients with diabetes mellitus with complications of other health problems such as shortness of breath, cough, fever and headache are severe symptoms in patients infected with Covid-19 (Seftiya & Kosala, 2021).).

The results of this research are also in line with research (Seftiya & Kosala, 2021) which has proven that diabetes mellitus is a significant risk factor for Covid-19 comorbidities. The results of this research are also in line with research (Satria et al., 2020) which states that men, old age, diabetes, and hypertension are risk factors for death in COVID-19.

The correlation between comorbid diabetes mellitus and the risk of death was RR 3,500 (95% CI: 1,797-6,815), which means that COVID-19 patients diagnosed with DM have a 3,500 times greater risk of experiencing the risk of death compared to patients who are not diagnosed with DM.

This is in line with the research (Drew & Adisasmita, 2021) with the title Symptoms and comorbidities that affect mortality of positive COVID-19 patients in East Jakarta, March-September 2020 which stated that the effect of a history of DM and COPD did not significantly affect mortality.

CONCLUSION

The conclusion of this research is the frequency of patients with gender, namely male as much as 35.9% and women as much as 64.1%, patients diagnosed with heart as much as 28.8% and not diagnosed with heart as much as 71.2%, patients diagnosed with diabetes mellitus as much as 23.5 % and not diagnosed with diabetes mellitus as much as 84.1%. There is a correlation between gender, comorbid heart illness and diabetes mellitus in Covid-19 patients with the risk of death at the Regional Hospital of Sukadana 2021.

GRATITUDE NOTE

REFERENSI

ADA. (2018). Standard medical care in diabetes 2018. *The Journal of Clinical and Applied Research and Education*, *41*(January), 1–150.

American Heart Association. (2020). *What Heart Patients Should Know About Coronavirus*.

Cascella et al. (2020). *Features, evaluation and treatment coronavirus (COVID-19).* In Statpearls [internet]. StatPearls Publishing.

Cen et al. (2020). *Risk Factors for disease progression in patients with mild to moderate Coronavirus disease 2019 a multi centre observational*. Clinical Microbiology and Infection. www.clinicalmicrobiologya ndinfection

Citroner, G. H. (2020). *Here's What Older At-Risk People Should Know About the Coronavirus.*

CNN Indonesia. (2022). *Studi: 8 Faktor Penyebab Pasien Covid-19 Meninggal Dunia*. diakses pada tanggal 11 April 2022. https://www.cnnindonesia.com/gaya-hidup/20220217153153-255-760555/studi-8-faktor-penyebab-pasien-covid-19-meninggal-dunia

Corman VM, Muth D, Niemeyer D, D. C. (2018). *Hosts and Sources of Endemic Human Coronaviruses*. Advances in Virus Research.
Data Rekam Medis RSUD Sukadana. (2021). *Data Rekam Medis RSUD Sukadana*. Sukadana.

De Caprio, D., Gartner, J., McCall, C. J., Burgess, T., Garcia, K., Kothari, S., & Sayed, S. (2020). Building a covid-19 vulnerability index. *Journal of Medical Artificial Intelligence*, *3*(December), 1–12. https://doi.org/10.21037/jmai-20-47

Dinas Kesehatan Pringsewu. (2021). *Data Rekam Medis RSUD Pringsewu,*. Pringsewu.

Dinkes Provinsi Lampung. (2021). *Data Pantauan COVID-19 Provinsi Lampung*. https://dinkes.lampungprov.go.id/peta-covid19-2/. diakses pada tanggal 30 Juli 2021

Drew, C., & Adisasmita, A. C. (2021). Gejala dan komorbid yang memengaruhi mortalitas pasien positif COVID-19 di Jakarta Timur, Maret-September 2020. *Tarumanagara Medical Journal*, *3*(2), 274–283. https://journal.untar.ac.id/index.php/tmj/article/view/11742

Kam KQ et all. (2020). *A Well Infant with Coronavirus Disease 2019 (COVID-19) with High Viral Load*. Clin Infect Dis. Published online February 28. DOI.

Karya, K. W. S., Suwidnya, I. M., & Wijaya, B. S. (2021). Hubungan penyakit komorbiditas terhadap derajat klinis COVID-19. *Intisari Sains Medis*, *12*(2), 708. https://doi.org/10.15562/ism.v12i2.1143

Lestari, N., Ichsan, B., Kedokteran, F., Surakarta, U. M., Lestari, K. N., & Alamat, M. P. H. (2020). Diabetes Melitus Sebagai Faktor Risiko Keparahan Dan Kematian Pasien Covid-19 : Meta-Analisis Diabetes Mellitus As a Risk Factor for Severity and Mortality of Covid-19 : a Meta-Analysis. *Biomedika*, *13*(1), 83–94. https://doi.org/10.23917/biomedika.v13i1.13544

Nawawi, M. I., Pathuddin, H., & Masrifah, R. (2021). Description of the Relationship Between Gender and Patients Status of Covid-19 in Indonesia. *Jukema (Jurnal Kesehatan Masyarakat Aceh)*, *7*(1), 76–81. https://doi.org/10.37598/jukema.v7i1.1069

Notoatmodjo, S. (2018). *Metodologi Penelitian Kesehatan*. Jakarta: Rineka Cipta.

PDPI. (2021). *Diagnosis dan Penatalaksanaan COVID di Indonesia*. https://www.persi.or.id/images/2020/data/buku_pneu. diakses tanggal 18 Agustus 2021

PDPI, PERKI, PAPDI, PERDATIN, & IDAI. (2020). Pedoman tatalaksana COVID-19 Edisi 3 Desember 2020. In *Pedoman Tatalaksana COVID-19*. https://www.papdi.or.id/download/983-pedoman-tatalaksana-covid-19-edisi-3-desember-2020

Ramanathan, K., Antognini, D., Combes, A., Paden, M., Zakhary, B., Ogino, M., Maclaren, G., & Brodie, D. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, *395*(20), 497–506.

Rashedi, J., & Asgharzadeh, V. (2020). Risk factor of COVID-19. *Le Infenzioni in Medicina*, 469–474.

Rashedi, J., Poor, B. M., Asgharzadeh, V., & Pourostadi, M. (2020). *Risk Factors for COVID-19*. *December*.

Riedel, S. et al. (2019). *Medical Microbiology*. New York: Mc Graw Hill Education / Medical.

Rifiana, A. J., & Suharyanto, T. (2020). Hubungan Diabetes Mellitus dan Hipertensi dengan Kejadian Corona Virus Deases-19 (Covid-19) di Wisma Atlet Jakarta Tahun 2020.

Universitas Nasional, *19*, 1–15.

Satgas Penanganan Covid-19 Nasional. (2021). *Laporan Gugus Tugas Covid-19*. https://covid19.go.id/

Satgas Percepatan Penanganan Covid-19 Kabupaten Lampung Timur. (2021). *Data Satgas Percepatan Penanganan Covid-19 Kabupaten Lampung Timur*. Lampung Timur.

Satria, R. M. A., Tutupoho, R. V., & Chalidyanto, D. (2020). Analisis Faktor Risiko Kematian dengan Penyakit Komorbid Covid-19. *Jurnal Keperawatan Silampari*, *4*(1), 48–55. https://doi.org/10.31539/jks.v4i1.1587

Seftiya, A., & Kosala, K. (2021). Epidemiologi Karakteristik Pasien Covid-19 di Kalimantan Utara. *Jurnal Sains Dan Kesehatan*, *3*(5), 645–653. https://doi.org/10.25026/jsk.v3i5.542

Sri Astuti. (2021). *Analisis Hubungan Penyakit Penyerta (Komorbid) Dengan Tingkat Keparahan Gejala Covid-19: Literature Review*. http://repositori.uin-alauddin.ac.id/.

Sugiyono. (2015). *Metode Penelitian Kombinasi (Mix Methods)*. Bandung: Alfabeta.

Suherwin. (2018). *Hubungan Usia, Jenis Kelamin Dan Riwayat Penyakit Dengan Kejadian Penyakit Jantung Koroner Di Instalasi Gawat Darurat Rumahsakit Tk.Ii Dr. Ak. Gani Palembang*. Jurnal Aisyiyah Medika. Palembang.

WHO. (2020). *Coronavirus disease (COVID 19) pandemic*. https://who.int. https://who.int

Widiantoro, R. (2021). *Studi Deskriptif Komorbiditas Pasien Penyakit Covid-19 Yang Meninggal di RSUD Kabupaten Karanganyar*. Program Studi Kesehatan Masyarakat, FIK Universita.

Wikipedia. (2020). *Wikipedia : Coronavirus, (Online*. https://en.wikipedia.org/ wiki/Coronavirus. diakses 18 Agustus 2021

Willim, H. A., Ketaren, I., & Supit, A. I. (2020). Dampak Coronavirus Disease 2019 terhadap Sistem Kardiovaskular. *E-CliniC*, *8*(2), 237–245. https://doi.org/10.35790/ecl.v8i2.30540

Worldometers. (2021). *Reported Cases and Deaths by Country or Territory*. https://www.worldometers.info/coronavirus/.

Yang & Yan. (2020). *Patients with RT-PCR-confirmed COVID-19 and Normal Chest CT*. Radiology. 2020 May;295(2):E3. doi: 10.1148/radiol.