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KOMORBIDITY MAPPING OF COVID-19 EVENTS IN WEST SUMATERA

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ABSTRACT: West Sumatra as one of the provinces in Indonesia affected by COVID-19 is among the 10 highest case provinces. West Sumatra also has a high comorbidity rate. Distribution of comorbid cases (elderly, hypertension and diabetes mellitus) are found in all districts / cities in West Sumatra. The aim of the study was to map the distribution of comorbid populations against COVID-19 events in West Sumatra. This type of research is quantitative descriptive. A systematic data search carried out by the comorbid population against COVID-19 was obtained from the health profile database of the health department, West Sumatra Central Statistics Agency 2018, and https://corona.sumbarprov.go.id/ to update the latest case of COVID-19 by Regency / City in West Sumater Province. The distribution of comorbidity is carried out using GIS analysis techniques using Arc-GIS 10.5 software. The highest incidence of COVID-19 and the highest comorbid population in West Sumatra is found in Padang City as the epicenter of spread. Data in the city of Padang are 65,550 elderly, hypertension 203,787 and diabetes mellitus 22,538 and 177 cases of COVID-19 positive confirmed. The conclusion is the high number of comorbid people makes Padang City a high-risk area for COVID-19 in West Sumatra Province.

Keywords: COVID-19, Komorbidity, West Sumatra, SIG

1. INTRODUCTION

Coronavirus is a collection of viruses from the subfamily Orthocronavirinae in the Coronaviridae family and the order of Nidovirales. This group of viruses that can cause disease in birds and mammals, including humans. In humans, coronaviruses cause generally mild respiratory infections, such as colds, although some forms of disease such as; SARS, MERS, and COVID-19 are more lethal [1].

Coronavirus (COVID-19), caused by the SARS-CoV-2 virus, is a global health problem because of the rapid spread of the disease. [2] This virus can be transmitted from human to human and has spread widely in China and more than 190 other countries and territories. [3] On March 12, 2020, WHO announced COVID-19 as a pandemic. [4] As of 12 April 2020, 105,000 deaths and nearly 1,700,000 incident cases have been confirmed globally [5] and these numbers are increasing every day.

Globally, as of May 1, 2020, there have been 4,013,728 confirmed cases of COVID-19, including 278,993 deaths, reported to WHO. [6] At present, Indonesia is the second highest country in the COVID-19 case in ASEAN after Singapore with a positive case of 14,265 and 991 deaths [7].

West Sumatra As one of the provinces in Indonesia affected by COVID-19 including the 10 provinces with the highest cases with positive cases 299 and Death 17, with the number of confirmed positive cases making West Sumatra ranked first in the highest positive cases of COVID-19 in Sumatra [8].

It turned out that after identifying and analyzing data from various sources that emerged showed an increase in the relationship and mortality in COVID-19 patients in high risk groups with comorbidities. [9] Older COVID-19 patients with comorbid conditions such as hypertension, diabetes, heart and lung disease, will be more susceptible to infection and have a higher mortality rate than the general population without these comorbidities [10].

Comorbidity is a concomitant disease that illustrates the condition that there are other diseases experienced besides the main disease (for example, diabetes, hypertension, cancer). Huang, et. al first reported the clinical features of 41 confirmed patients, 13 showed (32%) of them have underlying diseases, including cardiovascular disease, diabetes, hypertension, and chronic

obstructive pulmonary disease. [11] Wang, et.al reported the findings of 138 cases of COVID-19 results showing that 64 (46.4%) of them had comorbidities. The most important part, patients who were treated in intensive care units (ICU) had a higher number of comorbidities (72.2%) than those who were not treated in ICU (37.3%) [12].

As one of the provinces most affected by COVID-19 in Indonesia, West Sumatra has a high comorbidity rate. Based on the Central Statistics Agency of West Sumatra Province, West Sumatra Province Health Office, the distribution of cases of comorbid patients (elderly, hypertension and diabetes mellitus) is found in all regencies / cities in West Sumatra Province. The elderly population in West Sumatra is 512,911. The distribution of cases of hypertension prevalence in West Sumatra recorded 25.1% of cases of hypertension in Indonesia, while for the prevalence of Diabetes Mellitus recorded 1.3% of cases in Indonesia [13]. Therefore, it is necessary to look at this COVID-19 case with related comorbidities, so that it can at least reduce the impact of its severity and death rate by taking proper treatment.

2. RESEARCH METHODS

This research was conducted in the West Sumatra Province of Indonesia. This type of research is quantitative descriptive. Systematic data searches conducted for high-risk groups with comorbidities to COVID-19 positively confirmed were obtained from the health profile database of the health service, the Central Statistics Agency of West Sumatra Province 2018, and https://corona.sumbarprov.go.id/ to update the latest case COVID-19. The research analysis unit is the administrative area according to Regency / City. The population and sample of research are 19 regencies / cities in West Sumatra Province. Mapping the distribution of vulnerable groups is done by using GIS analysis techniques using Arc-GIS 10.5 software.

3. RESULTS AND DISCUSSION

Administratively, the Province of West Sumatra is directly bordered by: North side with North Sumatra Province, South side with Bengkulu Province, East side with Riau and Jambi provinces and West side with Indian Ocean [14]. Based on the 2010 population census, the population of West Sumatra reached 4,846,909 people, with a population density of 110 people / km^2. Regency / city which has the most population is Padang City, which reaches 833,562 inhabitants. While the regency / city that has the highest density level is Bukittinggi City, which is 4,400 inhabitants / km^2 [15].

The SARS-CoV-2 virus can be transmitted from person to person and has spread widely in China and more than 190 other countries and territories. [16] On March 12, 2020, WHO announced COVID-19 as a pandemic. [17] As of May 10, 2020 there were a total of 4,118,326 COVID-19 cases in 212 countries worldwide. There were 1,447,369 recovered cases or 84 percent of COVID-19 cases while the number of deaths reached 280,718 people worldwide. The country most affected by COVID-19 is the United States with 1,347,318 positive cases. The death toll from Corona in the US is 80,040. This number is more than Britain (31,587 people), Italy (30,395 people), Spain (26,478 people), and France (26,310 people) [18].

Update on the spread of the Corona virus (COVID-19) in Indonesia until 10 May 2020 there were 14,032 confirmed positive cases, with 2,698 people recovered and 973 dead indicating 387 new cases in the last 24 hours. The COVID-19 virus has spread in 34 provinces and 373 districts / cities throughout Indonesia. West Sumatra Province is among the top 10 with the highest case of COVID-19. Increase sharply by 10 2020 a total of 299 people are positive COVID-19. [19] With cases recovered 56 people and 17 people died.

The city of Padang is currently recorded as the most widespread cluster of positive cases of COVID-19 in West Sumatra Province with a total of 177 positive confirmed cases. Padang Panjang followed under 22 cases. Pesisir Selatan with 16 cases. Agam in the next position with a total of 14 cases. Only three regions in West Sumatra Province are still zero cases. This means, the three regions are still safe from the spread of the corona virus, namely Sijunjung Regency, Solok City, and Sawahlunto City. This can be seen in table 1.

The following is a map of the distribution of COVID-19 events in West Sumatra Province, dated 10 May 2020.

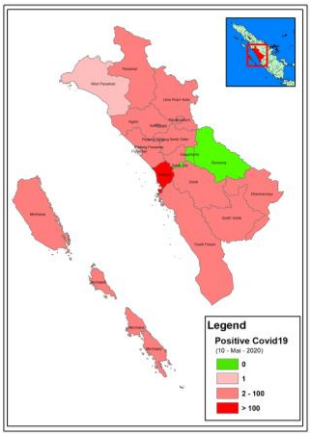

Fig 1. Map of COVID-19 Distribution in West Sumatra Province

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Table 1. Data distribution of COORIDITY and COVID-19 events in West Sumatra Province.

District / City	Area (km2)	Total population	Population density /km2	Total Elderly Population	Total population of hypertension	Total population of diabetes mellitus	Covid 19 case confirmed positive*
Kep. Mentawai	6.011,35	90.373	15	5.115	15.996	542	4
Pesisir Selatan	5.749,89	460.716	80	46.071	110.571	5.067	16
kab Solok	3.738,00	371.105	99	36.182	88.322	5.937	6
Sijunjung	3.130,80	233.810	75	19.172	62.427	2.805	0
Tanah Datar	1.336,00	347.407	260	46.552	109.780	7.295	8
Padang Pariaman	1.328,79	413.272	311	52.650	90.919	10.331	6
Agam	2.232,30	487.914	219	63.038	132.224	7.806	14
Lima Puluh Kota	3.354,30	379.514	113	47.135	92.980	6.072	5
Pasaman	3.947,63	278.480	71	24.283	64.607	2.506	2
Solok Selatan	3.346,20	168.411	50	13.371	40.587	2.357	3
Dharmasraya	2.961,13	241.571	82	16.982	56.044	4.589	13
Pasaman Barat	3.887,77	435.612	112	29.186	105.853	6.534	1
Padang	694,96	939.112	1351	65.550	203.787	22.538	177
Kota Solok	57,64	69.776	1211	4.772	21.909	1.186	0
Sawahlunto	273,45	61.898	226	6.449	20.612	1.795	0
Padang Panjang	23	52.994	2304	4.377	15.898	1.483	22
Bukittinggi	25,24	128.783	5102	10.251	40.180	2.446	10
Payakumbuh	80,43	133.703	1662	12.554	37.035	2.807	11
Pariaman	73,36	87.626	1194	9.078	20.504	2.979	1
Sumatera Barat	42.252,24	5.382.077	127	512.911	1.350.901	69.967	299

Source : West Sumatra Province Central Statistics Agency, West Sumatra Province Health Office and https://corona.sumbarprov.go.id/
* https://corona.sumbarprov.go.id/ tanggal 10/05/2020

Map of Komorbid Population Distribution in West Sumatra Province.

Data on the distribution of high-risk populations with various comorbidities obtained from the health profile of the observed province of West Sumatra, the elderly, hypertension and diabetes mellitus groups [36]. The highest number of elderly poupulation in West Sumatra is in the-city of Padang with a total of 65,550, for the highest hypertension and diabetes mellitus also in the city of Padang, with a total of 203,787 hypertension cases and 22,538 diabetes mellitus. The following is a map of the distribution of comorbid populations in West Sumatra from West Sumatra health profile data.

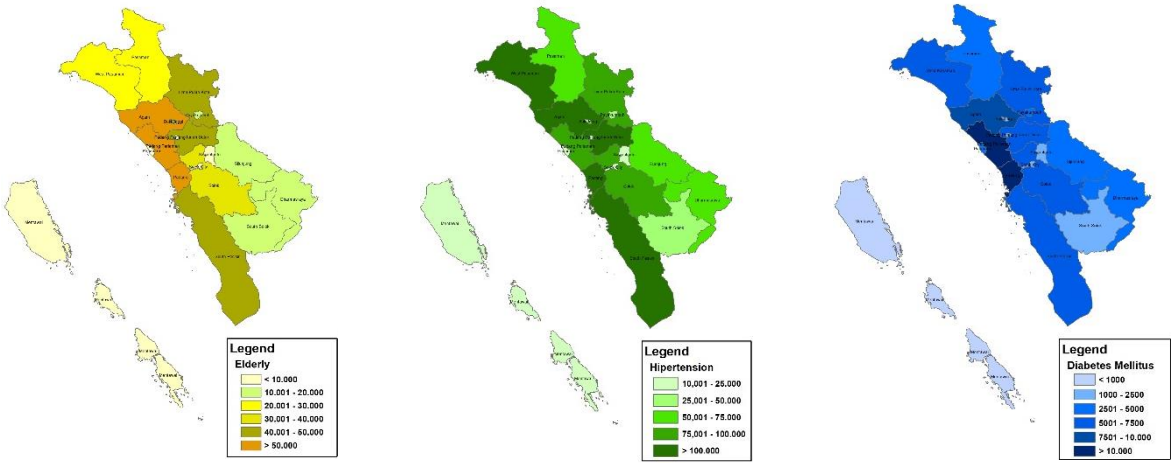

Fig 2. Map of Komorbid Population Distribution in West Sumatra Province

Based on existing data, the highest case of COVID-19 in West Sumatra is in the city of Padang and also has a high risk population infected with COVID-19, so it is necessary to supervise those with high risk populations. The elderly population and those with comorbid hypertension and diabetes mellitus, male sex, and active smokers are risk factors for SARS-CoV-2 infection. More sex distribution in males is thought to be associated with a higher prevalence of active smokers. In smokers, hypertension, and diabetes mellitus, an increase in ACE2 receptor expression is suspected [20][21].

Diaz JH [22] suspects that users of ACE inhibitors (ACE-I) or angiotensin receptor blockers (ARBs) are at risk of experiencing more severe COVID-19. Related to this allegation, the European Society of Cardiology (ESC) asserts that there is no conclusive evidence to conclude the positive or negative benefits of drugs of the class ACE-i or ARB, so users of both types of these drugs should continue their treatment. [23] However, a meta-analysis study conducted by Yang, et al. [24] showed that COVID-19 patients with a history of respiratory system diseases including tuberculosis would tend to have more severe clinical manifestations.

Older age was reported as a major risk factor related to the high death rate of COVID-19. This is because as you age, the body will experience a variety of physiological and immune decline due to the aging process. [25] If it is broken down by age in Indonesia, out of a total of 973 deaths due to Covid-19, 45.3% of them were aged over 60 years. Next, 39.6% in the age range 46-59 years, 10.5% in ages 31-45 years, 3.6% in ages 18 to 30 years, and 1.2% for ages 0 to 17 years.

Some other risk factors established by the Centers for Disease Control and Prevention (CDC) are close contact, including living with a COVID-19 patient and a history of travel to the affected area. Being in one environment but not in close contact (within a 2 meter radius) is considered a low risk [26].

The stability of SARS-CoV-2 in inanimate objects does not differ much compared to SARS-CoV. [22] Experiments carried out by van Doremalen et al. showing SARSCoV-2 is more stable in plastic and stainless steel (> 72 hours) than copper (4 hours) and cardboard (24 hours) [27].

This happened at the Epicenter in the city of Padang [28] That was Pasar Raya Padang region included in the administrative work area of Padang Barat sub-district which has found dozens of positive cases of COVID-19 [29] [36]. The same incident happened again where the first case on December 31, 2019, a disease diagnosed as pneumonia with an unknown causative agent was reported to have occurred in China earlier than the market in Wuhan which is now known as COVID-19.

West Sumatra provincial government follows all the rules of the Large-Scale Social Restrictions (PSBB) that exist in the rules that apply in the Regulation of the Minister of Health (Permenkes) RI Number 9 of 2020. and the Minister of Health Regulation (Permenkes) RI Number 9 of 2020 concerning PSBB guidelines. The Province of West Sumatra has imposed a Large-Scale Social Restrictions (PSBB) which began on April 22, 2020 and is still being extended. This PSBB rule applies at the provincial level which covers 19 regions including the city of Padang [30]. COVID-19 is a newly discovered disease therefore knowledge of its prevention is still limited. The key to prevention includes breaking the chain of transmission by isolation, early detection and basic protection [31][32].

Early detection and key isolation are the most important in anticipating the spread of COVID-19. All individuals who meet suspect criteria or have had contact with patients who are positive for COVID-19 should seek treatment at a health facility immediately. [33] [34] [35] WHO has also made a risk assessment instrument for health workers who treat COVID-19 patients as a guide for further action recommendations. For high-risk groups, it is recommended to stop all patient-related activities for 14 days, check for SARS-CoV-2 infection and isolation. In the low risk group, they are encouraged to carry out daily self-monitoring of temperature and respiratory symptoms for 14 days and seek help if the complaint is severe.

4. CONCLUSION

COVID-19 is transmitted from human to human and has spread widely. the highest incidence of COVID-19 in West Sumatra is in the area of Padang City. Padang residents have high comorbidities. The West Sumatra Provision Government, in particular the city of Padang, conducts monitoring of elderly people and residents with comorbidities who have a history of close contact with patients who are confirmed to be COVID-19 positive. High age, hypertension and Diabetes Mellitus in Padang City will increase COVID-19 mortality in West Sumatra Province.

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