Descriptive Epidemiological Study of TB Occurrence In Matraman District Health Center Post Covid-19 Pandemic

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A B S T R A C T

Objective :Tuberculosis (TB) is caused by Mycobacterium tuberculosis bacteria and is transmitted through coughing, sneezing, talking, or spitting. TB cases are more common in men than women and are higher in areas with poor living conditions and low socio-economic status. In 2018, East Java had 56,445 TB cases, with 31,211 cases in men and 25,234 cases in women. Puskesmas Kecamatan Matraman had 630 suspected TB cases in 2020, with 108 confirmed cases and a low TB CDR achievement. Methods: This is a descriptive study aimed at describing the frequency distribution pattern of Tuberculosis (TB) occurrences according to the variables of person, place, and time using a cross-sectional/prevalence study design approach. The study sample consisted of 159 individuals who were Tuberculosis (TB) patients, and the sample was selected using purposive sampling that met the inclusion and exclusion criteria. Results : show the gender and age group of TB patients. The study found that the majority of TB patients at Puskesmas Kecamatan Matraman were male. The proportion of male TB patients ranged from 55.45% to 67.5%, along with other factors such as lifestyle and environment. Most TB patients were in the productive age group of 15-59 years, Conclusion:indicating the need for prevention and control efforts targeted at this group, such as improving knowledge and awareness of TB, promoting healthy lifestyles, and providing accessible and quality health services. Diagnosis of TB patients can be done through microscopic examination or culture.
Keyword : TB, epidemiology, covid-19, puskesmas

ABSTRAK

Penyakit TBC disebabkan oleh bakteri Mycobacterium tuberculosis dan ditularkan melalui batuk, bersin, berbicara, atau meludah. Kasus TB lebih sering terjadi pada pria daripada wanita dan lebih tinggi di daerah dengan kondisi hidup yang buruk dan status sosial ekonomi rendah. Pada tahun 2018, Jawa Timur memiliki 56.445 kasus TB, dengan 31.211 kasus pada pria dan 25.234 kasus pada wanita. Puskesmas Kecamatan Matraman memiliki 630 kasus TB yang dicurigai pada tahun 2020, dengan 108 kasus yang terkonfirmasi dan pencapaian CDR TB yang rendah. Studi ini bertujuan untuk menggambarkan epidemiologi deskriptif kasus TB di Puskesmas Kecamatan Matraman setelah COVID-19, dengan fokus pada variabel orang, tempat, dan waktu. Metode penelitian yang digunakan adalah studi deskriptif dengan analisis data sekunder. Hasil penelitian menunjukkan bahwa jenis kelamin dan kelompok usia. Studi ini menemukan bahwa sebagian besar pasien TB di Puskesmas Kecamatan Matraman adalah laki-laki. Proporsi pasien TB laki-laki berkisar antara 55,45% hingga 67,5%, faktor-faktor lain seperti gaya hidup dan lingkungan. Sebagian besar pasien TB berada dalam kelompok usia produktif antara 15-59 tahun, yang menunjukkan perlunya upaya pencegahan dan pengendalian yang ditargetkan pada kelompok ini, seperti meningkatkan pengetahuan dan kesadaran tentang TB, mempromosikan gaya hidup sehat, dan menyediakan layanan kesehatan yang mudah dijangkau dan berkualitas. Diagnosis pasien TB dapat dilakukan melalui pemeriksaan mikroskopis atau kultur.

Kata Kunci : TBC, Epidemiologi, Covid-19, Puskesmas

INTRODUCTION

According to the WHO report, Tuberculosis (TB) still ranks as the 10th highest cause of death in the world in 2016. Therefore, TB remains a top priority worldwide and is one of the goals in the SDGs (Sustainability Development Goals) (Indah, 2018). TB is an infectious disease with multiple causes. The occurrence of TB is not solely caused by the microbacterium tuberculosis bacteria but also by its supporting factors, including the host's nutritional status, behavior, environmental conditions, and socio-economic factors (Fadhilah, 2019)). This is in line with the Triad Epidemiology theory proposed by John Gordon in epidemiology, which states that disease arises due to an imbalance of these three factors (host, agent, and environment) (Irwan, 2017).

Tuberculosis (TB) is an infectious disease caused by the Mycobacterium Tuberculosis bacteria. TB patient coughs, sneezes, speaks, or spits, the TB bacteria in their lungs can spread through the air and be inhaled by people around them (such as family members), potentially infecting them with TB, especially if their immunity is low, their nutritional status is poor, the environment supports TB bacteria growth, they have poor socio-economic conditions and bad behavior (Silalahi, Sirait and Romendra, 2021). This is why the number of TB cases is difficult to reduce; the high incidence of TB transmission leads to a high number of TB patients. TB transmission to TB patients' family members is a latent case. The number of TB cases is higher in men than in women. In men, TB cases amount to 294,727 (57.58%), while in women, it is 217,116 (42.42%). In children, TB cases amount to 10.62% or 54,340 individuals. In East Java Province, the number of TB patients in 2018 was 56,445, with men being the most affected at 31,211 and women at 25,234 (Enasta, Muhafidin and Setiawan, 2022).

In 2020, the number of suspected tuberculosis cases in Matraman sub-district health center was 630, according to standards. Out of which, there were 108 cases of tuberculosis. The number of confirmed bacteriological pulmonary tuberculosis cases that were registered and treated was 185, with a low CDR TB achievement (34%). In 2021, the total number of cases was 159, with 76 confirmed bacteriological pulmonary tuberculosis cases that were registered and treated, and a low CDR TB achievement (55%). The analysis shows that the CDR achievement has not reached its target (only 55%), as the data is based on patients visiting the health center (Matraman, 2022).

The occurrence of tuberculosis is important to study through epidemiology. Descriptive epidemiology aims to describe the distribution by referring to the analysis of time, person, and place (Najmah, 2022). DKI Jakarta Province is one of the areas that has a TB problem, and the high number of TB cases in Matraman District Health Center highlights the importance of receiving specific case management and treatment. Secondary data on variables such as person, place, and time have not been studied descriptively by the health center and previous researchers, thus making this research necessary to depict the descriptive epidemiology of tuberculosis (TB) occurrence in Matraman District Health Center post-COVID-19.

METHODS

Study Type: The research design used is descriptive with a cross-sectional survey

approach.

Study Population: The population of this study consists of all Tuberculosis (TB) patients in the Matraman District Health Center of Jakarta Timur in the years 2020-2021. The sample of the study includes 159 TB patients who have met the inclusion and exclusion criteria, and were selected through purposive sampling. (Sugiyono, Puspandhani ME., 2020) The research instrument used in this study is the annual report of TB patients in the Matraman District Health Center of Sudinkes Jakarta Timur in 2022.

Study Duration: The research will be conducted in 2020- 2021.

Study Procedure: Researchers utilized secondary data that were processed using SPSS 21 software, and the data were obtained from the annual report of Puskesmas Matraman, East Jakarta.

Data analysis: All data were analyzed using SPSS (Statistical Package for Social Science) version 21 software (IBM USA). Descriptive analysis was used to identify gender, age, type diagnose, Anatomy Location, Treatment History, HIV Status, Chest X-Ray Examination, TB Medication Guidelines, Microscopic Examination, Culture Examination with frequency and percentage

RESULTS

Table 1 shows that the majority of Tuberculosis (TB) patients in Matraman Sub-district Health Center are male (64.8%) and the age characteristics of patients mostly range from 15-59 years old (54.1%). The type of diagnosis is mostly bacteriologically confirmed (86.2%), with pulmonary anatomical location more prevalent than extrapulmonary, namely 82.4%. The proportion of new TB cases is 63.5%, compared to only 30.2% relapse cases. All TB patients have a negative HIV status (100%). The majority of patients did not undergo chest X-ray examination (83%) compared to those who had and tested positive for TB (17%). Category 1 OAT guidelines are mostly used (93.7%), while the majority of patients did not undergo microscopic examination (51.6%) compared to those who did and tested positive (25.8%). Additionally, a large proportion of patients have not undergone a culture test (61%).

Table 1
Distribution of Tuberculosis (TB) Cases in Matraman District Health Center Based on Demographic Variables (N=159)

No	Variable	Number of Patiens	
		n	%
1	Sex		
	Male	103	64,8
	Female	56	35,2
2	Age		
	< 15 years	23	14,5
	15-59 years	86	54,1
	≥ 60 years	50	31,4
3	Diagnosa Type		
	Comformed Bacteriology	137	86,2
	Klinis Diagnosed	22	13,8
4	Anatomical Location		
	Pulmonary	131	82,4
	Pulmonary extra	28	17,6

5	Treatment History		
	New	101	63,5
	Case Replace	48	30,2
	Transfer	10	6,3
6	HIV Status		
	Positive	0	0
	Negative	159	100
7	Chest X-Ray Examination		
	Not Cundected	132	83
	Condacted (positive)	27	17
8	Treatment Category		
	Category 1	149	93,7
	Category 2	10	6,3
9	Microscopis Examination		
	Not cundected	82	51,6
	Cundected (positive)	41	25,8
	Cundected (negative)	36	22,6
10	Bacterial Culture		
	Examination	97	61
	Not Cundected	32	20
	Cundected (+3)	11	7
	Cundected (+2)	19	12
	Cundected (+1)		

In Matraman Sub-district Health Center, the highest number of Tuberculosis (TB) cases were found in Pisangan Baru Sub-district, with a percentage of 27.7%, followed by Kayu Manis Sub-district with a percentage of 17%. Utan Kayu Utara and Palmeriam Sub-districts had the same percentage of 15.7% compared to other sub-districts which did not reach above 10%. The lowest number of cases was found in Utan Kayu Selatan I and Kebon Manggis Sub-districts, with only 7%, as shown in Table 2.

Table 2
Distribution of TB Incidence Based on Patient Location Variable

No	Patient Location	Number of Patient	
		n	%
1	Sub-district Pisangan Baru	44	27,7
2	Sub-district Utan Kayu Selatan I	14	8,8
3	Sub-district Utan Kayu Selatan II	13	8,2
4	Sub-district Utan Kayu Utara	25	15,7
5	Sub-district Kayu Manis	27	17
6	Sub-district Palmeriam	25	15,7
7	Sub-district Kebon Manggis	11	7
	Total	159	100

The incidence of Tuberculosis (TB) cases in Matraman Sub-district Health Center fluctuated in 2020 and 2021. The highest number of cases in 2020 was recorded in October, with 22 cases (13.8%). In 2021, the highest number of cases occurred in July and November, with 16 cases (10.7%). Incidence of new cases in January 2020 was 12 (7.5%), which decreased to 10 cases (6.7%) in 2021. Number of cases decreased further to 8 cases with the discovery of new

cases in November 2020 and May 2021. When looking at the monthly incidence of cases, the cases persistently appeared from July to December. Despite the fluctuation of cases, the number of cases decreased to 13 cases and 11 cases in December 2020 and 2021, respectively, as shown in Table 3.

Tabel 3
Distribution of TB Incidence by Monthly Time Variable

No	Month of Occurrence	Number of Patients			
		Year 2020		Year 2021	
		n	%	N	%
1	January	12	7,5	10	6,7
2	February	11	6,9	12	8
3	March	14	8,8	15	10
4	April	17	10,7	10	6,7
5	Mei	11	6,9	8	5,3
6	June	16	10,1	13	8,7
7	Jule	10	6,3	16	10,7
8	August	9	5,7	13	8,7
9	September	16	10,1	14	9,3
10	Oktober	22	13,8	12	8
11	Nopember	8	5	16	10,7
12	Desember	13	8,2	11	7,3
	Jumlah	159	100	150	100

DISCUSSION

The variable of a person is all the characteristics or traits present in a human being that can influence the occurrence of a disease (Widyastuti, 2018). Majority of Tuberculosis (TB) patients at the Matraman District Health Center are male (64.8%). This study is consistent with (Ibrahim and Yundri, 2021) research, which found that the majority of TB patients at the Pijoan Baru Health Center are male (67.5%). (Widyastuti, 2018), study also revealed that 66.1% of pulmonary TB patients are male and 33.9% are female. Research further supports this finding, showing that the majority of pulmonary TB patients in Semarang City are male (58.2%) (Hartanto *et al.*, 2019) Other studies have also explained that the total number of smear-positive pulmonary TB patients in the Banyumas Regency work area in 2013-2015 was highest in 2014, with a total of 981 patients, of which 55.45% were male and 44.55% were female (Pratama, Gurning and Suharto, 2019). Majority of TB patients are male, as shown in research conducted at the Matraman District Health Center, Pijoan Baru Health Center, Semarang City, and Banyumas Regency, with varying percentages of male patients. Gender can be a risk factor in the occurrence of TB, as there are biological differences between males and females that can affect the immune system. Other factors such as healthy lifestyle behaviors and environmental factors can also influence the occurrence of TB. In the context of TB prevention and control, these risk factors need to be considered. Effective TB prevention and control efforts involve various factors, including early detection and treatment, efforts to increase public knowledge and awareness of TB, and improved access to affordable and quality health services.

The prevalence of TB increases with age, as there is a higher chance of TB bacterial reactivation among those who have previously suffered from Pulmonary TB, and longer exposure duration to TB bacteria compared to younger age groups (Hartanto *et al.*, 2019). TB

patients in Matraman Health Center are mostly in the productive age group, ranging from 15 to 59 years old (54.1%), and this study is in line with (Widiawati *et al.*, 2021), which shows that approximately 75% of TB patients are in the productive age group (15-59 years old). This is due to the fact that the productive age group tends to engage in daily activities outside the home, making them more likely to come in contact with TB patients (Dahmar *et al.*, 2022). Most TB patients in Matraman Health Center are in the productive age group, which is consistent with other studies showing that around 75% of TB patients are in the same age group. Efforts to prevent and control TB in the productive age group need to be improved, such as increasing public awareness and knowledge about TB, promoting healthy lifestyles, and expanding access to affordable and quality healthcare services. These efforts can help reduce the incidence of TB among the productive age group and help achieve global targets for TB control.

One of the ways to diagnose a patient with bacteriologically confirmed TB is through microscopic examination or culture. (D, 2017) In this study, the diagnosis of Tuberculosis (TB) patients at Matraman Community Health Center was mostly confirmed bacteriologically (51.6%). Bacteriologically confirmed TB patients are those who are proven positive through direct microscopic examination, TB culture and susceptibility testing, or culture of M.tb from biological samples (sputum and tissue). This group includes: 1) Bacteriologically confirmed pulmonary TB patients who are positive for acid-fast bacilli (AFB) smear microscopy; 2) Pulmonary TB patients with M.tb culture-positive; 3) Pulmonary TB patients with a positive rapid molecular test for M.tb; 4) Extra-pulmonary TB patients confirmed bacteriologically through AFB, culture or rapid test from affected tissue samples; 5) Children with TB diagnosed bacteriologically. Note: All patients who meet the above definition must be recorded and reported regardless of whether TB treatment has started or not (D, 2017). This indicates that bacteriological examination methods have been widely used to confirm the diagnosis of TB in patients. The diagnosis of bacteriologically confirmed TB patients can provide certainty about the appropriate type of treatment and help limit the spread of TB infection to other patients. Although the diagnosis of bacteriologically confirmed TB is important, there are also cases of TB patients who are not bacteriologically confirmed. Therefore, additional diagnostic methods such as radiological examination, serological testing, and clinical monitoring and symptoms of patients are needed to confirm the diagnosis of TB in patients who are not bacteriologically confirmed.

In this study, patients with pulmonary anatomical location were more frequent than extrapulmonary location, accounting for 82.4%. This result is consistent with (Dahmar *et al.*, 2022), which reported 89.2% pulmonary TB and 10.8% extrapulmonary TB (Azizi *et al.*, 2015). Based on the anatomical location of the disease, TB is classified into pulmonary and extrapulmonary TB. Pulmonary TB occurs in the lung parenchyma, while extrapulmonary TB affects organs other than the lungs, such as the pleura, lymph nodes, meninges, bones, joints, skin, intestines, kidneys, urinary tract, and genitals (Naomi *et al.*, 2016). The classification of TB into pulmonary and extrapulmonary is based on the anatomical location of the disease. Pulmonary TB is easier to detect as its symptoms, such as cough, fever, and shortness of breath, are more easily identified, hence more often examined and treated. In contrast, extrapulmonary TB can be more difficult to detect due to its variable symptoms depending on the affected organ, thus requiring more specific examination and treatment.

The proportion of newly diagnosed TB cases was higher than the relapse cases, with 63.5% and 30.5%, respectively. Patients with TB are classified based on their history of previous treatment, which is divided into new patients and those with a history of previous treatment. New

patients are those who have never received TB treatment before or have received treatment for less than a month, with positive or negative sputum results and any anatomical location of the disease. Meanwhile, patients with a history of previous treatment are those who have received TB treatment for at least one month, with positive or negative sputum results and any anatomical location of the disease. Patients with a history of previous treatment are further divided into several groups, such as relapse cases, treatment failure cases, and default cases. Relapse cases are TB patients who have previously received TB treatment and have been declared cured or completed treatment, but then return to treatment with positive sputum or positive culture results (Naomi *et al.*, 2016). Classification of TB patients based on their history of previous treatment is important because it can provide an overview of treatment success and the risk of relapse cases. In addition, patients with a history of previous treatment are also divided into several groups, such as treatment failure and default cases, to facilitate analysis and evaluation of the TB treatment program. In this regard, it is essential for healthcare workers to perform routine sputum and culture examinations on TB patients, both new patients and those with a history of previous treatment, to ensure treatment success and prevent relapse cases.

Identification of suspected TB can be obtained from the evaluation results of chest X-ray examinations. All abnormalities that support TB should be evaluated. Radiological screening can be done on chest X-ray images obtained from the process of diagnosing TB or other diseases. (D, 2017) This study shows that a majority of chest X-ray examinations were not performed, with a percentage of 83%, and only 17% were conducted due to certain considerations that need to be taken into account during chest X-ray examination. This may be due to certain considerations that need to be taken into account during chest X-ray examination, such as cost, availability of healthcare facilities, and adequate medical staff knowledge in interpreting chest X-ray images. Therefore, efforts need to be made to improve access to and quality of chest X-ray examinations as part of effective TB diagnosis and treatment efforts.

The treatment of pulmonary tuberculosis using anti-tuberculosis drugs (ATD) with the directly observed treatment short course (DOTS) method consists of categories I, II, III, and an insert. Based on the results of this study, it was found that the ATD used mostly belong to category I (93.7%). In comparison, category II was only 6.3%. Category I (2 HRZE/4 H3R3) is used for new TB patients. Meanwhile, category II (2 HRZES/HRZE/5 H3R3E3) is used for retreatment patients (those who failed the category I treatment or relapse patients) (Loihala, 2016). The DOTS method is crucial in the treatment of pulmonary tuberculosis as it can increase patient compliance in taking medication and reduce drug resistance. This can help patients achieve a faster recovery and reduce the risk of spreading TB to others.

Pulmonary tuberculosis in adults can be diagnosed by detecting positive acid-fast bacilli (AFB) in microscopic examination of sputum. (Safithri, 2017) In addition to establishing the diagnosis, sputum examination can also determine the potential for transmission and assess the success of treatment. (D, 2017) A positive result is declared when at least two out of three sputum smear tests for AFB are positive. (Safithri, 2017) This study showed that 51.6% of patients did not undergo microscopic examination, while 25.8% tested positive and 22.6% tested negative. In contrast, the results of a study by (Inayati, 2016) showed that out of 90 patients with pulmonary TB, 90% had negative sputum smear test results, while 10% had positive results. (Inayati, 2016). Microscopic examination of sputum is one of the ways to diagnose pulmonary TB by detecting positive AFB. Sputum examination can also determine the potential for transmission and assess the success of treatment. A positive result is declared when at least two out of three sputum smear tests for AFB are positive. However, the study results show that many

microscopic examinations are not performed (51.6%), and only a small proportion of them are positive (25.8%), while the remaining are negative (22.6%). Another study showed different results, where most of the sputum smear test results were negative (90%), while only a small portion was positive (10%). Therefore, routine and accurate microscopic examination of sputum is necessary to establish an accurate diagnosis of pulmonary TB.

The examination of culture can be done using solid media (Lowenstein-Jensen) and liquid media (Mycobacteria Growth Indicator Tube) to identify Mycobacterium tuberculosis (M.tb). This examination is conducted in laboratory facilities that monitor their quality (D, 2017). To culture Mycobacterium tuberculosis, around 50-100 bacteria/ml sputum are needed to grow as a culture (Wulandari, Wiqoyah and Mertaniasih, 2017). This research indicates that the culture examination has not been done in most cases (61%), while those that have been done with a result of (3+) amounted to 20%. In (Inayati, 2016), the positive sputum culture of M. tuberculosis was 14%, and the negative culture was 86%. Culture examination is one of the methods used to identify Mycobacterium tuberculosis, the causative agent of tuberculosis. The commonly used culture examination methods are solid media such as Lowenstein-Jensen and liquid media such as Mycobacteria Growth Indicator Tube (MGIT). Culture examination needs to be carried out in a laboratory facility that monitors its quality to ensure accurate results. Sufficient bacterial content in the sputum sample is required to perform the culture examination, which is usually around 50-100 bacteria/ml sputum. Although the culture examination is an essential method in diagnosing tuberculosis, it is not always conducted due to requiring a laboratory with monitored quality and a considerable amount of time to obtain the results. Therefore, the culture examination is usually performed if the results of other examinations, such as microscopic sputum examination and other TB tests, are still uncertain, or if there is a case of TB resistant to standard OAT.

Conclusion and Suggestions

Most TB patients are male. This is based on several studies showing that the majority of TB patients in various regions are male, with varying percentages. Gender is considered a risk factor for TB because there are biological differences between men and women that can affect the immune system. Other factors such as healthy lifestyle behaviors and environmental factors also contribute to the occurrence of TB. Effective TB prevention and control involve various factors, including early detection and treatment, increasing public knowledge and awareness of TB, and improving access to affordable and quality health services. TB prevalence increases with age, and the productive age group (15-59 years) is the most affected. This is because this age group is more likely to be involved in daily activities outside the home, increasing the likelihood of contact with TB patients. Therefore, prevention and control efforts need to focus on this age group by promoting healthy behaviors, increasing awareness of TB, and improving access to health services. The diagnosis of TB patients is usually confirmed bacteriologically through microscopic examination or culture.

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Conflict of Interest

The authors declare no conflicts of interest in this study.

Author Contribution

AB: Conceptualization, study design, analysis, data interpretation, and overall guidance; AF: Consultant in the field of public health data frameworks and conceptualization; MF: Supervision from research conception to final approval of the proposed version; TM: Compilation of articles, overall guidance, and facilitation in article revision for content accuracy; ASN: Contribution in writing manuscript content and reviewing the results of writing.

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