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Tuberculosis Screening in Patients with Diabetes Mellitus at the Internal Medicine Clinic of UGM Academic Hospital: Descriptive Study

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Abstract

Background: In 2021, the International Diabetes Federation stated that there were around 536.6 million people suffering from DM worldwide, 90.2 million of whom were in Southeast Asia. Indonesia ranks 5th in terms of population with the highest DM in the world. The number of people with DM in Indonesia is around 19.5 million and is projected to increase to 28.6 million in 2045. The prevalence of Diabetes Mellitus in Yogyakarta is 2.4%. Diabetes Mellitus and TB are included in the top 10 diseases in Yogyakarta in 2023. Sleman is the second largest district after Bantul for the number of DM sufferers. Tuberculosis is a public health problem that is a global challenge and is the third highest cause of death in Indonesia and the first leading cause of death due to infectious diseases. TB management in Yogyakarta is not optimal when seen from Treatment Coverage and Treatment Success Rate data. Diabetes Mellitus is an important risk factor for the development of Active TB. TB screening in DM patients is necessary to prevent the development of active TB. This study aims to determine the percentage of TB patients from all DM patients treated at UGM Academic Hospital.

Materials and methods: This research is descriptive quantitative research using primary and secondary data. Data analysis uses univariate analysis. The sample in this study was taken using a simple random sampling technique. There were 109 respondents who met the inclusion and exclusion criteria.

Results: The results of the study showed that there was 1 (0.92%) DM patient who was positive for TB, 22 (20.18%) DM patients who were suspected of TB through the Perjaka 2M screening and 3 (2.75%) DM patients who were suspected of TB from thorax x-ray results.

Conclusion: Screening is one of the efforts in finding TB cases that can be done actively or passively.

Keywords: Diabetes Mellitus, Tuberculosis, TB-DM Screening, PERJAKA 2M, Thorax X-ray

1. INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia that occurs due to abnormalities in insulin secretion, insulin action or both. According to the Indonesian Endocrinology Association (PERKENI), based on the cause, DM can be classified into 4 groups, namely type 1 DM, type 2 DM, gestational DM and other types of DM. Based on the 2021 International Diabetes Federation (IDF) report, there are around 536.6 million people who suffer from Diabetes Mellitus throughout the world, 90.2 million of whom are in Southeast Asia. The prevalence of people with Diabetes Mellitus was reported by the IDF to be 10.5% in 2021 and is projected to increase to 12.2% in 2045 worldwide. Indonesia ranks 5th in terms of population with the highest DM after China, India, Pakistan and the United States. The number of people with DM in Indonesia is around 19.5 million and is projected to increase to 28.6 million in 2045. Based on Riskesdas 2018, the prevalence

of Diabetes Mellitus in Indonesia among those aged over 15 years is 2.0%. The prevalence of Diabetes Mellitus in Yogyakarta is 2.4% (1,2,3).

The Yogyakarta Special Region Provincial Health Service stated that DM and TB were included in the top 10 diseases in Yogyakarta in 2023. Diabetes Mellitus was ranked 2nd, namely 61,010 cases (22.2%) while TB was ranked 10th, namely 1,137 cases. (0.4%). There are 72,258 DM patients spread across 5 districts in Yogyakarta, Sleman is the second largest district after Bantul with a total of 17,050 DM sufferers and 100% of DM patients receive services according to standards. Data from the Gadjah Mada University Academic Hospital (UGM Academic Hospital) shows that DM is ranked 2nd in the top 10 diseases (4).

Diabetes Mellitus is an important risk factor for the development of Active TB. Diabetes Mellitus will weaken the immune system, causing sufferers to have a 3 times higher chance of suffering from Active TB. The results of TB treatment in TB sufferers with comorbid DM will experience more failure than those without comorbid DM due to delays in conversion of sputum culture, risk of death during treatment and risk of relapse. So, as the number of DM sufferers increases, the number of TB sufferers will also experience a very high increase (7).

Tuberculosis (TB) is a public health problem that is a global challenge and is the third highest cause of death in Indonesia and the first leading cause of death due to infectious diseases. According to the World Health Organization (WHO) report in 2015, at the global level there were an estimated 9.6 million new TB cases, of which 3.2 million cases were women. With 1.5 million deaths due to TB. According to the 2015 WHO report, the number of TB cases in Indonesia is estimated to be 1 million new TB cases per year (399 per 100,000 population) with 100,000 deaths per year (41 per 100,000 population). Data on TB Treatment Coverage for the Yogyakarta Special Region (DIY) Province is still low, namely 31% of the national target of 80%. Meanwhile, the TB Treatment Success Coverage/Treatment Success Rate for Yogyakarta Province is 86% with a national target of 90%. This shows that the TB treatment program in the Special Region of Yogyakarta Province is not optimal (5,6).

In line with the program from the Ministry of Health of the Republic of Indonesia regarding the national Tuberculosis control program, two-way screening is expected to be carried out to reduce morbidity, severity and transmission of Tuberculosis in patients with DM. In 2023, UGM Academic Hospital, in collaboration with the Sleman Health Service, PKRS, Lung Clinic and TB Clinic, UGM Academic Hospital in September – October 2023, has started to carry out TB screening in DM sufferers but has not yet been able to reach all DM patients that seeking treatment at the UGM Academic Hospital.

2. MATERIALS AND METHODS

a. Research Design

This research is descriptive quantitative research using primary and secondary data. The patients involved in this study were DM patients who came to the internal medicine clinic at UGM Academic Hospital from mid-June – July 2024. Primary data was obtained from questionnaires that we asked the patients, including the length of time they were diagnosed with DM, family history of DM, adherence to medication, and TB screening with the PERJAKA 2M instrument. PERJAKA 2M (PERangi geJAla batuK lebih dAri 2 Minggu) is TB screening instrument from the Sleman's health department. PERJAKA 2 M means fight cough symptoms for approximately 2 weeks. This instrument contains the main symptoms and additional symptoms that usually appear in patients suspected of having TB. If only one of the symptoms asked is answered "yes" then the patient is suspected of having TB. We obtain secondary data from patient medical records, namely: identity, medical record number, age & gender, weight, height, laboratory results, x-ray results, medical diagnosis, treatment history, and sputum check results. Patients positive for DM will have their medical records checked to see whether they have had a thorax x-ray this year, if not, they will be asked to have a thorax x-ray. This thorax x-ray will be read by a radiology specialist according to the doctor's duty schedule. Next, it will be managed according to the TB screening and diagnosis algorithm. DM patients who are willing to be respondents will be screened. Patients with positive TB symptoms & positive

thorax x-ray, patients with positive TB symptoms & negative thorax x-ray and patients with negative symptoms and positive thorax x-ray will have their phlegm checked.

This research was conducted at the Internal Medicine Clinic at UGM Academic Hospital. Data collection was carried out after obtaining an ethical approval letter from the UGM FK-KMK Ethics Commission.

b. Population and Sample

The population in this study were all patients diagnosed with Diabetes Mellitus who came for control on 11 June – 31 July 2024. The inclusion criteria in this study were patients who were willing to be respondents, patients who had medical record data with a diagnosis of DM, both NIDDM and IDDM and DM patients who were diagnosed with TB during the study period, the patient was willing to undergo a thorax x-ray if the EHR (Electronic Health Record) had not had a thorax x-ray examination performed in the year walk, and be willing to have a sputum phlegm check if the X-ray and screening results point to Tuberculosis. The exclusion criteria in this study were patients under 18 years of age and patients who were pregnant.

c. Analysis Method

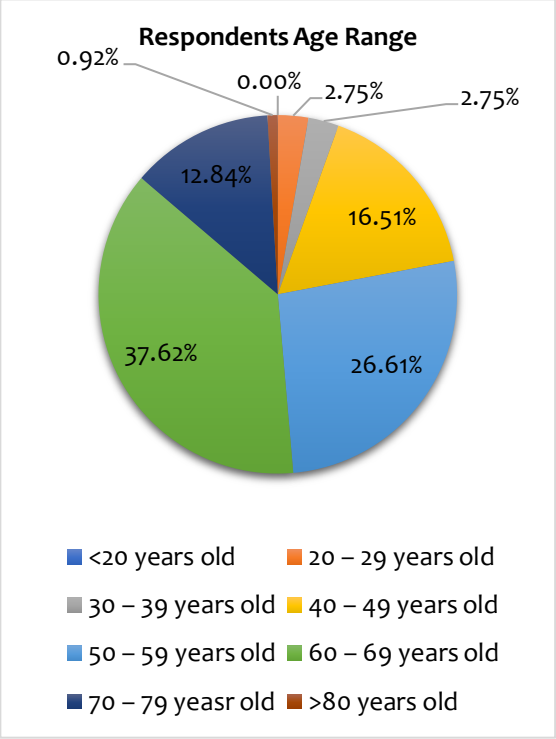
All of the data were summarized using descriptive statistics, a percentage data, and present on both diagram and table.

3. RESULTS

a. DM Patients Profile

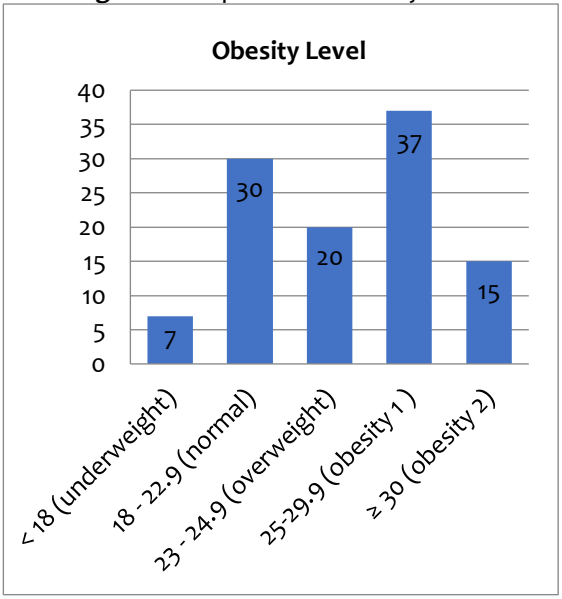
The number of DM patient visits at the Internal Medicine Clinic at UGM Academic Hospital can reach 400 patients per month. The sample for this research consisted of 109 respondents. The age range of research respondents can be seen in the figure below (**figure 1**).

Figure I. Respondents Age Range



Most respondents were female (52.29%). We processed data in the form of respondents' weight and height to obtain BMI data, the complete results can be seen in the following figure (**figure 2**).

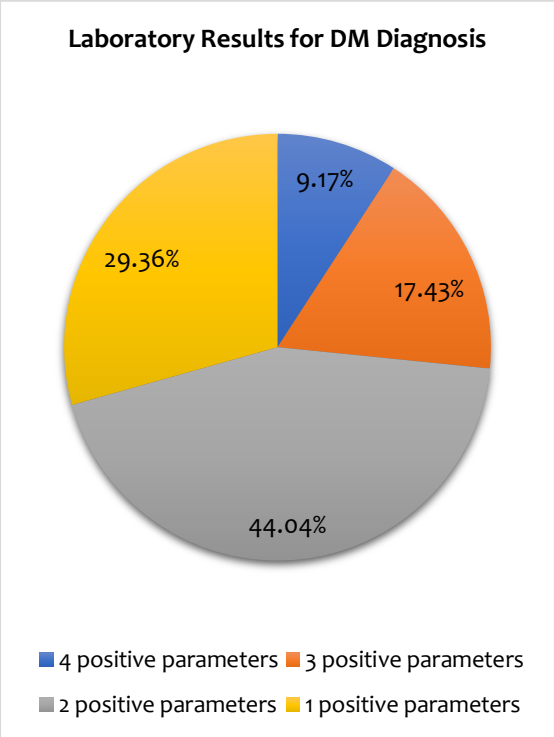
Figure 2. Respondents Obesity Level



Based on PERKENI (2019) DM patients are patients diagnosed with DM as indicated by supporting examinations of HbA1c ≥6.5%, fasting sugar ≥126mg/dl, 2-hour PP (post prandial) sugar

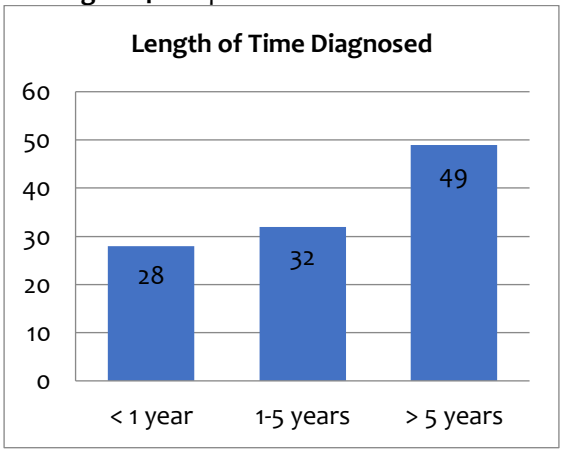
≥200mg/dl, and instant glucose ≥200mg/dl.1 The following figure is the distribution of patients diagnosed with DM based on laboratory result parameters (**figure 3**).

Figure 3. Respondents' Laboratory Results for DM Diagnosis



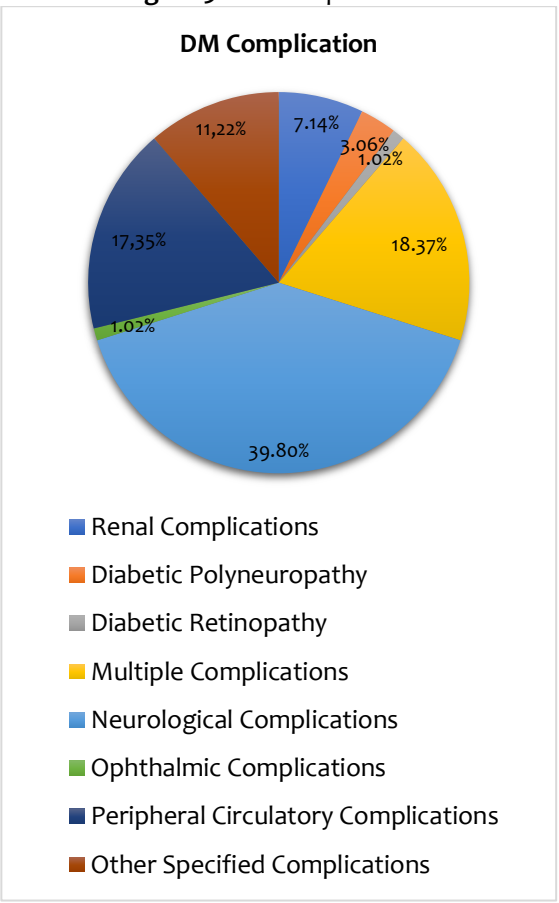
The distribution of the length of time respondents have suffered from DM can be seen in the figure below (**figure 4**).

Figure 4. Respondents' Duration of DM



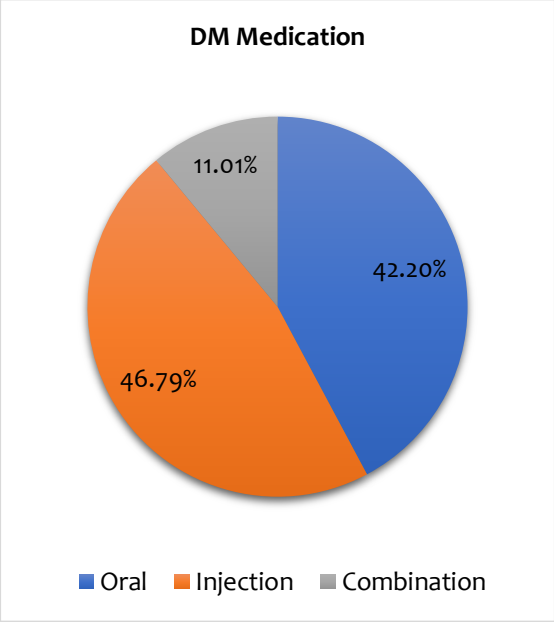
Most of the respondents in this study had a family history of DM, namely 50.46%. Most of the respondents were type 2 DM patients, namely 91.74%. Based on the doctor's diagnosis, the majority (89.91%) of respondents were DM patients with complications. DM complications in the respondents of this study can be seen in the following figure (**figure 5**).

Figure 5. DM Complications



Most respondents (93.58%) adhered to DM treatment. The types of drugs consumed by respondents in this study can be seen in the figure below (**figure 6**).

Figure 6. Types of DM Medication



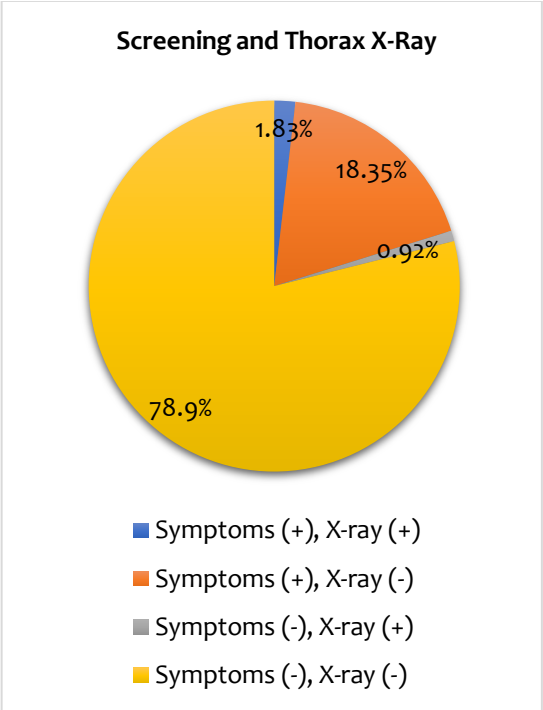
b. TB Patient Profile

We carried out TB screening results using the Health Service instrument, namely PERJAKA 2M (Perangi Gejala Batuk Kurang lebih 2 Minggu /Fight Cough Symptoms for Approximately 2 Weeks). This screening is carried out by looking at the main symptoms of TB, namely continuous coughing and phlegm for 2 weeks and other symptoms, namely: decreased appetite, decreased body weight, fever/chills for more than 1 month, body weakness/malaise, sweats at night without activity. , chest pain, shortness of breath and coughing up blood. In this study, data was obtained: 22 people (20.18%) were suspected of having TB and 87 people (79.82%) were not TB.

Apart from the PERJAKA 2 M instrument, we also carried out TB screening by looking at the results of the respondent's thorax x-ray. Most respondents (97.25%) had normal thorax x-ray results/not TB. There were 3 (2.75%) respondents whose thorax x-ray results showed a picture of TB.

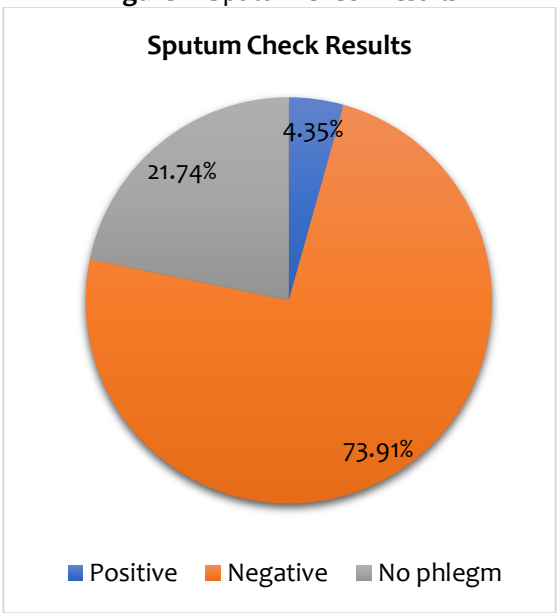
The distribution of screening results with the PERJAKA 2M instrument and thorax x-ray can be seen in the following figure (**figure 7**).

Figure 7. Results of PERJAKA 2M Screening and Thorax X-ray



From the table above, the respondents who had to have their phlegm checked were respondents with positive symptoms & positive thorax x-ray, positive symptoms & negative thorax x-ray and negative symptoms & positive thorax x-ray, namely 23 people (21.10%). The results can be seen in the following figure (**figure 8**).

Figure 8. Sputum Check Results



4. DISCUSSION

a. DM Patient Profile

Tuberculosis and diabetes are major health problems in developing country like ours. Patients with diabetes mellitus are at a higher risk of developing tuberculosis. Presentation of tuberculosis in diabetes varied. Thus, clinician should have strong degree of suspicion and investigate accordingly to institute early treatment. Based on the research results above, there were 109 respondents who met the sample criteria. The average age of respondents in this study was 58.06 years. Most DM patients are of productive age, aged 19 - 59 years as many as 56 people (51.38%). However, this number is not too significantly different from DM patients who are elderly (>60 years old). When viewed in more detail based on the age range, the respondents of this study were mostly at the age of 60-69 years, namely 41 people (37.62%). Similar results were also obtained from Komariah and Rahayu's research (2020) which stated that most DM patients in Depok were aged 46-65 years as many as 93 patients (69.4%) (8). This is in accordance with data from Riskesdas 2018 which shows that the prevalence of Diabetes Mellitus based on doctor's diagnosis is mostly in the age range 55-64 years (6.29%) (3,8).

Respondents in this study were mostly female, as many as 57 people (52.29%). Riskesdas 2018 data shows that the prevalence of Diabetes Mellitus in Indonesia is higher in women (1.78%) than men (1.21%). The results of this study are also in line with the research of Husain et al in 2020 conducted research on the prevalence of type 2 DM during the co-19 pandemic in family doctor practices in Manado. Most patients with type 2 DM are female, namely 121 people (56%). Pratiwi's research (2022) shows that in 2018 there were 217 people diagnosed with diabetes in Jambi province, 142 people (65.4%) were female (10). Komariah and Rahayu's research (2020) states that most DM patients who seek treatment at the Proklamasi Outpatient Primary Clinic, Depok, West Java are female, as many as 81 people (60.4%) (3,8,9,10).
According to Bullard et al (2018) the proportion of prevalence of diabetes mellitus is higher in the female sex group compared to the male sex group, this is due to the menopausal cycle which physically encourages the distribution of fat deposits, where women have a greater chance of experiencing an increase in BMI (10).

The results of this study also showed that 30 respondents (27.52%) had a normal Body Mass Index (BMI) and the rest were abnormal. Of the 79 patients with abnormal BMI, 7 (6.42%) of them had BMI below normal while 73 (66.06%) other respondents had BMI above normal. Thus, the respondents in this study were mostly overweight/IMT more than normal. Based on data Directorate of Prevention and Control of Non-Communicable Diseases of Health Ministry in 2016, the prevalence of overweight or overweight (13.5% Riskesdas 2013) and obesity (15.4%, Riskesdas 2013) which is one of the biggest risk factors for diabetes is increasing steadily compared to Riskesdas 2007 and 2010 (11).

The results of this study are in accordance with the research of Masi and Oroh (2018) which states that there is a relationship between obesity and the incidence of Diabetes Mellitus in the working area of the Ranomut Health Center, Manado city (12). Similar results were also found in the research of Nasution et al (2018) which showed that the most dominant variable related to the incidence of type 2 DM in WUS was obesity (13). Another similar study is the research of Handayani et al (2018) which states that there is a relationship between obesity and the incidence of type 2 DM at the Olak Jambi Health Center and obese people have a 4-fold risk of developing type 2 DM than people who are not obese (14).

The prevalence of obesity in DM is high, and vice versa, the incidence of DM and impaired glucose tolerance in obesity is common. Obesity, especially central obesity is significantly associated with metabolic syndrome (dyslipidemia, hyperglycemia, hypertension) based on insulin resistance. Insulin resistance in diabetes with obesity requires a special approach. The goal of obesity management is not only to lose weight, but also to lower blood glucose, improve lipid profile, lower blood pressure, and reduce mechanical stress on the lower extremities, namely hips and knees (1).

To reconfirm that the respondents in this study were diagnosed with DM, we used 4 parameters to diagnose DM: fasting plasma

glucose ≥ 126 mg/dL, plasma glucose ≥ 200 mg/dL 2-hours after glucose tolerance test, current plasma glucose ≥ 200 mg/dL, and HbA1c ≥ 6.5%. The majority of respondents were diagnosed with DM from 2 parameters as many as 48 people (44.04%). The examinations conducted by doctors at the Bima 2 Polyclinic were quite diverse, the most frequently performed were HBA1C (92.66%) and Glucose during (92.66%). Respondents in this study were mostly diagnosed with DM for more than 5 years, as many as 49 people (44.95%). Syahputri et al's research (2023) shows that more patients treated at Dr. Soebandi Hospital and Bina Sehat Jember Hospital were diagnosed with DM for more than 5 years, namely 50 people (67.6%) than patients diagnosed with DM for less than 5 years, namely 24 people (32.4%) (15). Research by Yosephine et al (2021) shows that DM patients who seek treatment at Hospital X in Jakarta mostly suffer from DM for 5 years or more, namely 57 people. There were 53 people who suffered from DM for less than 5 years (16).

This study also showed that there were respondents who were diagnosed with DM for less than 1 year, namely 28 patients (25.69%). The existence of patients diagnosed with DM for less than 1 year indicates the addition of DM patients from time to time. The prevalence of people with Diabetes Mellitus was reported by IDF to be 10.5% in 2021 and is projected to increase to 12.2% in 2045 worldwide. The prevalence of DM in Southeast Asia is also projected to increase from 8.3% in 2021 to 11.3% in 2045 (2).

Most of the respondents in this study had a family history of DM, namely 55 people (50.46%). However, the number of respondents diagnosed with DM without a family history of DM is also not much different, namely 54 people (49.54%). Research by Syahputri et al (2023) conducted in Jember showed that most DM patients had a family history of DM, as many as 119 people (80.40%) (15). According to Nasution et al (2021), one of the risk factors for DM is a family history of DM, in addition to age and physical activity (13). According to Perkeni (2019) Factors that affect DM are divided into 3 parts, namely modifiable factors, non-modifiable factors and other factors . Modifiable risk factors include: overweight (BMI≥ 23), physical inactivity, hypertension (>140/90), dyslipidemia (HDL < 35 mg/dL and/or triglycerides > 250 mg/dL), and unhealthy diet (less fiber & high glucose) (1). Non-modifiable risk factors include: race and ethnicity, family history of DM, age (the risk for glucose intolerance increases with age), history of giving birth to a baby with a baby's birth weight > 4000 grams or a history of having had gestational DM, and a history of low birth weight (less than 2.5 kg). Other factors associated with DM risk include: People with metabolic syndrome who have a previous history of impaired glucose tolerance or impaired fasting blood glucose and people with a history of cardiovascular disease, such as stroke, CHD, or PAD (Peripheral Arterial Diseases) (17).

Respondents in this study were mostly diagnosed with type 2 DM, as many as 100 patients (91.74%). Insulin resistance in muscle and liver cells, as well as pancreatic beta cell failure have been recognized as the pathophysiology of central damage of type 2 DM. Recent studies have shown that beta-cell failure occurs earlier and is more severe than previously thought. Other organs involved in type 2 DM are fat tissue (increased lipolysis), gastrointestinal (incretin deficiency), pancreatic alpha cells (hyperglucagonemia), kidney (increased glucose absorption), and brain (insulin resistance), which contribute to impaired glucose tolerance. The causes of type 2 DM vary from predominantly insulin resistance with relative insulin deficiency to predominantly insulin secretion defect with insulin resistance (1).

According to IDF, type 2 diabetes is the most common type of diabetes, accounting for more than 90% of all diabetes worldwide. Globally, the prevalence of type 2 diabetes is high and increasing across regions. This increase is driven by population ageing, economic development and increased urbanization which can lead to sedentary lifestyles and greater consumption of unhealthy foods associated with obesity (2).

Patients with DM who seek treatment at the Internal Medicine Polyclinic are mostly accompanied by complications, namely 98 people (89.91%). The type of complication that most often occurred in the respondents of this study was neurological complications, which amounted to 42 people (42.86%). These results differ from the research of Rif'at et al (2023) which states that

patients with DM in Pekanbaru mostly have cardiovascular-related complications, as many as 66 people (39.2%) (18). Research by Firdiawan et al (2022) showed the same thing as research by Rif'at et al (2023). Firdiawan et al stated that DM patients in South Sumatra experienced the most complications of heart problems / CHF (congestive heart failure), namely 5 people (25%) (19).

The results of research by Edwina et al (2015) stated that the highest incidence of chronic complications in patients with type 2 DM with chronic complications in hospitalized patients in Padang was diabetic nephropathy (42.6%), followed by complications of diabetic retinopathy (37.6%), coronary heart disease (33%), peripheral vascular disease (30%), diabetic neuropathy (23.4%), and finally cerebral vascular disease (19%) (20).

Respondents in this study mostly treated DM with insulin injection, namely 51 people (46.79%). Management of insulin therapy in outpatient DM patients is a challenge for clinicians because patients must be able to monitor blood glucose control independently. Patients must be aware of the importance of lifestyle modification, self-monitoring of blood glucose, and easy and safe use of insulin (21).

The same results were obtained in Fikry and Aliya's research (2019) which conducted research on therapeutic patterns in patients with Type 2 Diabetes Mellitus at the Inpatient Installation of Dr. H. Moch. Ansari Saleh Hospital, Banjarmasin. The results of their study showed that the use of drugs in patients with type 2 DM during hospitalization (January - March 2018 period) was insulin (88.00%) with the division of each insulin based on how it works as follows: fast-acting insulin 202 items (41.7%), long-acting insulin 207 items (45.5%) and mixed insulin 4 items (0.8%) (22). Different results were obtained from the research of Firdiawan et al (2022) which stated that DM patients undergoing hospitalization at Siti Fatimah Hospital, South Sumatra, mostly used oral therapy from the biguanid group, namely metformin with a percentage of 39.66% (19).

Respondents in this study mostly stated that they were compliant with DM treatment, namely 102 people (93.58%). Rismawan et al (2023) stated that the level of compliance of DM patients in Bali was mostly in the high category, namely 27 people (47.4%), while the other 20 people (35.1%) were in the medium category and 10 other people (17.5%) were in the low category (23). Research by Pratiwi et al (2022) showed that the level of compliance of DM patients in Makassar City was mostly in the moderate category of 8 people (66.67%), some others in the high category of 4 people (33.33%) and none (0%) were in the low category (10). Rismawa et al and Pratiwi et al both used the Morisky Medication Adherence Scale (MMAS-8) questionnaire to measure the level of compliance of DM patients taking medication (10,23).

Things that affect the compliance of DM patients taking medication include: level of knowledge, length of DM, age and motivation. Maymuna et al (2023) state that the factors that influence compliance with taking medication are the level of knowledge and length of suffering from DM. Amira et al (2019) state that there is a relationship between age, knowledge, and motivation with anti-diabetic drug compliance behavior (24,25).

b. Overview and Suitability of Chemotherapy

Based on the screening and diagnosis of TB patients by looking at the results of TB screening based on the PERJAKA 2M instrument and thorax X-ray, it was found that there were 23 respondents who had to have a sputum check. Of these 23 respondents, 1 respondent (4.35%) had a positive sputum test result. According to the Ministry of Health (2023) screening is one of the efforts in finding TB cases that can be done actively or passively (26). Screening is carried out by assessing TB symptoms and using tests, examinations or other procedures that can be applied quickly, such as examinations with thoracic X-rays. TB screening is targeted at target groups such as the general population in areas with a high TB burden, household contacts, close contacts, people at clinical risk such as people living with HIV (ODHIV), people with diabetes mellitus (DM), children and the elderly aged >65 years, homeless people, vulnerable and marginalized populations (slum-dense and slum-poor settlements), migrant workers, and can be carried out in populations in special places such as prisoners, boarding schools / boarding schools, social institutions, refugee shelters and large

gathering places (workplaces, markets, supermarkets and other public facilities) (26).

The Ministry of Health has initiated screening of people with DM with TB symptoms and X-Ray since 2021 with the support of the Global Fund TB Component budget for the 2021 - 2023 fiscal year. The activity was carried out in 38 districts/cities with DM and TB burden. The results of this activity show that 5,186 people with DM were screened for TB symptoms and X-rays. The achievement of TB Symptom Screening and X-ray in Persons with Diabetes Mellitus (DM) in 2022, the number of suspected TB obtained was 1,907 people (29.4%) of the number screened for TB. Then, the TB case findings in people with DM amounted to 707 TB cases (10.9%) of people with DM who were screened for TB. The percentage of people with DM positive for TB has exceeded the expected target of 2% (reference based on Raspati C, Koesoemadinata et al, Latent Infection and Pulmonary TB Disease among Patients with Diabetes Mellitus in Bandung, Indonesia, 2017) (26).

This study showed that 1 out of 109 DM patients had TB (0.92%). This shows that the percentage of DM positive for TB in UGM Hospital is low, not exceeding the expected target of 2%. The number of people with DM positive for TB in Indonesia varies. Research by Azzahra et al (2023) conducted in Tidore stated that as many as 12 out of 48 Diabetes Mellitus patients suffered from tuberculosis (25%) (27). Fauziah's research (2016) on the Incidence of Pulmonary Tuberculosis in Type 2 Diabetes Mellitus Patients in the Internal Medicine Inpatient Room of Dr. M. Djamil Padang Hospital showed that there were 29 cases of pulmonary TB out of 748 type 2 DM patients (3.88%) (28).

5. CONCLUSION

Based on the results of research that has been conducted on DM patients by looking at the results of TB screening based on the PERJAKA 2M instrument and chest X-ray, data was obtained that there were 23 respondents out of 109 respondents who were declared TB suspects. Of these 23 respondents, 1 respondent (4.35%) had a positive sputum test result. This shows that screening is one of the efforts in finding TB cases that can be done actively or passively. Screening is carried out by assessing TB symptoms and using tests, examinations or other procedures that can be applied quickly, such examinations include examinations with chest X-rays (26).

6. ACKNOWLEDGEMENTS

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REFERENCES

1. PERKENI, Pedoman Pengelolaan Diabetes Melitus Tipe 2 Dewasa di Indonesia. Indonesia: PB PERKENI. 2019.
2. International Diabetes Federation, IDF Diabetes Atlas 10th Edition. 2021. Available from: https://diabetesatlas.org/atlas/tenth-edition/. [Last retrieved on 2024 January 10]
3. Kementerian Kesehatan RI, Riskesdas 2018 .2019. Available from: https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf. [Last retrieved on 2024 January 10]
4. Dinas Kesehatan DIY. Buku Data 2023. 2024. Available from: https://dinkes.jogjaprov.go.id/download/view/1#. [Last retrieved on 2024 August 1]
5. Menteri Kesehatan RI. Peraturan Menteri Kesehatan Republik Indonesia Nomor 67 Tahun 2016 Tentang Penanggulangan Tuberkulosis. 2016. Available from: https://peraturan.bpk.go.id/Home/Details/114486/permenkes-no-67-tahun-2016. [Last retrieved on 2024 January 10]
6. Kementerian Kesehatan RI. Dashboard Tuberkulosis Indonesia. 2020. Available from: https://tbindonesia.or.id/pustaka-tbc/dashboard-tb/. [Last retrieved on 2014 Februari 28]
7. Kementerian Kesehatan RI. Konsensus Pengelolaan Tuberkulosis dan Diabetes Melitus (TB-DM) di Indonesia. 2015. Available

from: https://pbperkeni.or.id/wp-content/uploads/2022/07/Konsensus-Nasional-TB-DM.pdf . [Last retrieved on 2024 January 10]

8. Komariyah & Rahayu, S. Hubungan Usia, Jenis Kelamin, dan Indeks Masa Tubuh dengan Kadar Gula Darah Puasa Pada Pasien Diabetes Melitus Tipe 2 di Klinik Pratama Rawat Jalan Proklamasi, Depok, Jawa Barat. Jurnal Kesehatan Karya Husada.2020. Vol 11(1);41-50
9. Husain dkk. Prevalensi Diebetes Melitus Tipe 2 Pada Masa Pandemi Covid di Praktik Dokter Keluarga Kota Manado. Jurnal Kedokteran Komunitas dan Tropik. 2022. Vol10 (2); 417-420
10. Pratiwi dkk. Gambaran Kepatuhan Minum Obat Pasien Diabetes Melitus Tipe 2 di Puskesmas Pertiwi Kota Makasar. Wal'afiat Hospital Journal. 2022. Vol 3(2); 156-164
11. Kementerian Kesehatan RI. Diabetes, Fakta dan Angka. 2016. Available from: https://p2ptm.kemkes.go.id/uploads/2016/11/Diabetes-Fakta-dan-Angka.pdf [Last retrieved on 2024 August 1]
12. Masi, G & Oroh, W. Hubungan Obesitas dengan kejadian Diabetes Melitus di Wilayah Kerja Puskesmas Ranomut Kota Manado.2018. e-Journal Keperawatan. Vol 6(1); 1-6
13. Nasution dkk. Hubungan Obesitas terhadap Kejadian Diabetes Melitus Tipe 2 pada Wanita Usia Subur di Wilayah Kerja Puskesmas Pintupadang. Jurnal Muara Sains, Teknologi, Kesehatan dan Ilmu Kesehatan. 2018. Vol 2(1); 240-246
14. Handayani dkk. Hubungan Obesitas dan Aktivitas Fisik dengan Kejadian Diabetes Melitus Tipe II di Wilayah Kerja Puskesmas Olak Kemang Tahun 2018. Jurnal Kesmas Jambi. 2018. Vol 2(1);1-11
15. Syahputri dkk. 2023 Epidemiology of Pulmonary Tuberculosis in Diabetes Mellitus Patients. Jurnal Kesehatan. 2023. Vol 14(2); 345-352
16. Yosephine dkk. Faktor yang Memengaruhi Kejadian Tuberkulosis Paru pada Penderita Diabetes Mellitus di Rumah Sakit X. 2021. Jurnal Kesehatan. Vol 12(3); 344-351
17. Nasution dkk. Faktor Risiko Kejadian Diabetes Melitus. Jurnal Ilmu Kesehatan. 2021. Vol 9(2). Hlm 94-102
18. Rif'at dkk. Gambaran Komplikasi Diabetes Melitus pada Penderita Diabetes Melitus. Jurnal Keperawatan Profesional. 2023. Vol 11(1)
19. Firdiawan dkk. Pola Penggunaan Obat dan Karakteristik Pasien diabetes Melitus Tipe 2 Rawat Inap di Rumah Sakit Siti Fatimah Sumatera Selatan. Jurnal Ilmiah Bakti Farmasi. 2022. Vol7(2);32-38
20. Edwina dkk. Pola Komplikasi Kronis penderita Diabetes Melitus Tipe 2 Rawat Inap di Bagian Penyakit Dalam RS Dr. M. Djamil Padang Januari 2011 – Desember 2012. Jurnal Kesehatan Andalas. 2015. Vol 4(1). Hlm 102-106
21. PERKENI. 2021. Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia. PB PERKENI
22. Fikry & Aliya. Pola Terapi pada Pasien Diabetes Melitus Tipe 2 di Instalasi Rawat Inap RSUD Dr. Moch. Ansari Saleh, Banjarmasin Periode Januari – Maret 2018.Sainstech Farma.2019. Vol 12(1); 54-59
23. Rismawan dkk. 2023. Hubungan Kepatuhan Minum Obat terhadap Kadar Gula Darah Sewaktu pada Penderita Diabetes Melitus Tipe 2. Jurnal Riset Media Keperawatan. 6(1). Hlm 23-30
24. Maymuna dkk. Faktor yang Berhubungan dengan Kepatuhan Minum Obat pada Penderita Diabetes Melitus di Wilayah Puskesmas Tamalanrea Kota Makassar. Window of Public Health journal. 2023. Vol 4(6). Hlm1049-1064
25. Almira dkk. Faktor-Faktor yang Berhubungan dengan Perilaku Kepatuhan Minum Obat Anti Diabetes pada Penderita Diabetes Melitus Tipe 2 di Puskesmas Teluk Dalam Banjarmasin. Homeostasis.2019. Vol 2(1); 9-12
26. Kementerian Kesehatan RI. 2023. Laporan Program Penanggulangan Tuberkulosis Tahun 2022. [Online]. Available from URL: https://tbindonesia.or.id/wp-content/uploads/2023/09/Laporan-Tahunan-Program-TBC-2022.pdf . [Last retrieved on 2024 August 1]

27. Azzahra dkk. Gambaran Foto Toraks Pada Pasien Diabetes Melitus dengan Tuberkulosis dan Tanpa Tuberkulosis di RSD Kota Tidore Kepulauan. Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran. 2023. Vol 3(11); 853-859
28. Fauziah dkk. Insidensi Tuberkulosis Paru pada Pasien Diabetes Melitus Tipe 2 di Ruang Rawat Inap Penyakit Dalam RSUP Dr. M.Djamil Padang. Jurnal Kesehatan Andalas. 2016. Vol 5(20); 349-354