



STUDY OF FACTORS CAUSING COMPLIANCE IN TAKING MEDICATION FOR DIABETES PATIENTS

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ABSTRACT

With 236 million Muslims, or 84.3% of the population, Indonesia is the second largest Muslim country in the world, according to the World Population Review. It is undoubtedly a problem when all risk variables coincide with an activity. Diabetes is a long-term condition that arises from insufficient insulin production by the pancreas or ineffective use of insulin by the body. The purpose of this study was to determine the factors that cause compliance with taking medication for diabetics in the Palembang embarkation Hajj pilgrims. Method is descriptive and uses snowball sampling techniques through recording, interviews, and observations. Results of the total number of prospective hajj pilgrims in 2024, 8,473 have diabetes, 483 of whom are prospective hajj pilgrims through the Palembang Embarkation. The majority of diabetes sufferers are women (54.86% of respondents), while the majority of prospective male hajj pilgrims (45.14%) are men. The most common comorbidities in prospective hajj pilgrims at the Palembang Embarkation are diabetes sufferers under the age of 60 (64.80%), hypertension at 60.19%, and dyslipidemia at 39.81%. It is important to carry out regular health checks to prevent/avoid the emergence of unwanted diseases and to improve the quality of life for the better.

Keywords: compliance with taking medication; diabetes; hajj pilgrims

INTRODUCTION

Scholars agree that every Muslim who is financially and physically able to perform the Hajj is required to do so, as it is a form of worship that is directly mandated by the primary source of Islam, the Qur'an (Muhamad et al., 2024). The confession of faith, prayer, fasting, and zakat are more important in Islam than hajj. Stated differently, there are two legal statuses for hajj: for those who are able, it is an obligation; for those who are not, it is not. The term "able" refers to being secure in all aspects of life academically, financially, physically, and mentally even while traveling (Agustin et al., 2024). With 236 million Muslims, or 84.3% of the population, Indonesia is the second largest Muslim country in the world, according to the World Population Review (2024). This is undoubtedly a problem when all the risk variables coincide with an activity (Aryani Dwi Hartanti1, 2020).

The quota for prospective Indonesian hajj pilgrims for 1445 H/2024 M is 221,000 pilgrims. Furthermore, Indonesia is given an additional quota of 20,000 pilgrims. The remaining 10,000 quotas are for extraordinary pilgrims, and the remaining 10,000 are for regular pilgrims. Thus, there are 241,000 pilgrims from Indonesia this year, including 21,320 hajj pilgrims and 27,680 special pilgrims, and 554 Kloter (flight groups) will be formed from regular hajj pilgrims. From 14 embarkations, they will take off from 13 airports. On May 12, 2024, the first Indonesian hajj pilgrims are expected to depart for Saudi Arabia (Direktorat Jenderal Penyelenggaraan Haji dan Umrah, 2024). There are 8,506 hajj pilgrims at the Palembang embarkation, including 1,116 from the Bangka Belitung Islands, 7,295 from South Sumatra, and 95 hajj officers. They departed in the first and second waves after being divided into 19 flight groups (kloter) (Kemenag Sumsel, 2024).

According to data from the Ministry of Health, approximately 15% of all Hajj pilgrims will have a history of diabetes by 2023. Dehydration, metabolic diseases, and other medical emergencies are some of the complications that can arise during Hajj due to the high frequency of diabetes among pilgrims. To avoid and treat these consequences, diabetic patients must take their medication as prescribed. However, adherence to medication can be affected by a number of factors, including social support, patient understanding, and access to healthcare resources. Blood glucose management can be affected by the intense physical activity of Hajj and the significant environmental changes that occur in the Holy Land. Diabetic patients who do not take their medication as prescribed face the serious danger of experiencing hypoglycemia or hyperglycemia, which can lead to life-threatening situations (Kemenkes .R.I, 2023). Diabetes is a long-term condition that arises from insufficient insulin production by the pancreas or ineffective use of insulin by the body.(Kiarie et al., 2023). One of the hormones that controls blood sugar is insulin (Kania Sari et al., 2024). Uncontrolled blood sugar is a common cause of diabetes (Numsang et al., 2023) which damages many body systems over time, including blood vessels and nerves (Aditya et al., 2024). A number of risk factors for diabetes can be divided into two categories: modifiable risk factors, such as obesity and overweight (Rauf et al., 2024), lack of physical activity, hypertension, decreased glucose tolerance (Ndetei et al., 2024), or previous fasting blood sugar, and smoking (Kamel, 2024), and non-modifiable risk factors, such as race and ethnicity, age, sexual orientation, and family history (Prakash et al., 2024).

To improve the health of Hajj pilgrims, it can help to understand the factors that influence medication compliance in diabetic pilgrims at the Palembang embarkation (Asri Rahmawati et al., 2024). In general, patient characteristics, treatment-related factors, and the caliber of medical care are significant determinants of medication adherence in patients with diabetes (Cindy & Hartono, 2024). Effective interventions to improve patient compliance can be developed with the help of a thorough understanding of compliance factors (Lestari Makmuriana, 2024). The purpose of this study was to determine the factors causing compliance in taking medication for diabetes sufferers among the 2024 Palembang embarkation Hajj pilgrims.

METHOD

This research is descriptive and uses snowball sampling techniques through recording, interviews, and observations. This research aims to collect current information and concentrates on efforts to identify a problem in its current state so that it can be investigated and examined comprehensively. According to the above interpretation, descriptive research is defined as research that aims to characterize events or incidents that are ongoing or experienced. Research that describes a symptom or social phenomenon that produces descriptive data in the form of written or spoken words about real problems as they exist at the time the research is conducted is known as descriptive research.

RESULT AND DISCUSSION

Class I Health Quarantine Center Palembang uses the Regulation of the Minister of Health No. 15 of 2016 concerning the Health Check of Hajj Pilgrims as its regulation. So that all health check activities for prospective hajj pilgrims (Permenkes R.I No. 15, 2016). In addition to the Minister of Health Regulation, there is also a Decree of the Minister of Health (Kepmenkes) that regulates the technical standards for Hajj health checks. Hajj health checks include basic checks, supporting checks, laboratory tests, independence tests, and mental health tests. Hajj health checks are carried out at the health center in the district. Several things that are measured in the Hajj health check include weight, height, waist circumference, blood test, urine test, sputum test, radiology, EKG, and physical examination (Kepmenkes R.I, 2023).

Table 1. Patient Characteristics

Characteristics	f	%
Gender	483	
Female	265	54,86
Male	218	45,14
Age	483	
< 60 year	313	64,80
> 60 year	170	35,20
Blood sugar levels	483	
Controlled	483	100
Uncontrolled	0	0
Comorbidities	483	
None	267	55,28
Exist	216	44,72
Hypertension	130	60,19
Dyslipidemia	86	39,81

Based on table 1, it is evident that of the 483 prospective pilgrims who took part in the Palembang Embarkation Hajj, the majority of diabetics were women (54.86% of respondents), while the majority of prospective male pilgrims (45.14%) were men. Comorbidities among prospective Palembang Embarkation Hajj pilgrims occurred most often in diabetics under 60 years old (64.80%), with hypertension at 60.19 percent and dyslipidemia at 39.81 percent.

Table 2.
Use of Other Drugs

Therapy Classes	Drug Name	%
Antihypertensive	Amlodipine	53,6
	Captopril	26,4
	Candesartan	20
Dyslipidemia	Simvastatin	64,3
	Atorvastatin	16,2
	Fenofibrate	19,5

Based on the results of the study, in addition to DM drugs, it is proven that antihypertensive and dyslipidemic drugs are the most commonly used drugs by prospective pilgrims for the Palembang Embarkation. This is due to the fact that the majority of respondents have dyslipidemia and hypertension as comorbidities (table 2). Amlodipine (53.6%) is the most commonly recommended drug of the antihypertensive therapy class, while simvastatin (64.3%) is the most commonly prescribed drug for dyslipidemia.

Table.3
Compliance Level

Characteristic	Amount
Compliance	
Currently	74,3%
Height	25,7%

The results of the study showed that the majority of respondents (74.3%) had a moderate level of compliance. This finding indicates that intervention is needed to increase the level of respondents' medication compliance.

Table 4.
Level of Knowledge

Characteristics	Amount
Pengetahuan	
Low	35%
Currently	50%
Height	15%

Based on the results of the study, the majority of respondents had poor knowledge (35%) and moderate knowledge (50%), while 15% had excellent knowledge. Respondents' lack of education may be the cause of these findings.

Patient Characteristics

Evidently, of the 483 prospective pilgrims who took part in the Palembang Embarkation Hajj, the majority of diabetics were women (54.86% of respondents), while the majority of prospective male pilgrims (45.14%) were men. Comorbidities among prospective Palembang Embarkation Hajj pilgrims occurred most often in diabetics under 60 years old (64.80%), with hypertension at 60.19 percent and dyslipidemia at 39.81 percent. The study consisted of 590 patients with type 2 diabetes. Among them, 310 (52.5%) were male and 280 (47.5%) were female. The gender difference was quite large ($p < 0.001$), with the average age of males and females being 57.46 ± 14.93 and 50.38 ± 14.85 years, respectively. The difference in sex was statistically significant ($p < 0.001$), with the average weight of males and females being 71.33 ± 13.72 and 62.52 ± 14.38 kg, respectively (Ali et al., 2023). The majority of respondents with Type 2 Diabetes Mellitus in the work area of the Pahandut Health Center in Palangka Raya City are predominantly elderly, with an age range of 15 respondents (36.6%) (56–65 years old), and the majority are female, namely 22 people (53.7%) out of a total of 41 respondents. In addition, it was also found that as many as 36 respondents (87.9%), the majority of respondents, had suffered from Type 2 DM for more than 3 months, and as many as 25 respondents (61%) underwent an examination at the nearest health service > 1 x in 1 month (Febertha Atuh et al., 2024). Meanwhile, according to (Du et al., 2024) Among the 334 hospitalized patients with T2DM who were included, the overall prevalence of sarcopenia was 30.2% (101/334). The prevalence of sarcopenia was 41.3% (66/160) in men and 20.1% (35/174) in women, which suggests that sarcopenia is significantly more common in men with T2DM than in women with T2DM ($P < 0.05$).

Research results (Tang et al., 2023) Participant characteristics of 2482 patients with T2DM aged 65–99 years were included, and their basic characteristics and clinical data are presented in Table 1. The average age of elementary school was 72.4 ± 5.8 years, and the known duration of diabetes was 13.5 ± 9.0 years. The prevalence rates of hypertension, hyperlipidemia, and smoking were 62.5%, 78.8%, and 15.6%, respectively. The patient's mean eGFR was 68.9 ± 22.0 mL/min/1.73 m², and the median (interquartile range) of UACR was 19.2 mg/g (9.7–54.3 mg/g). Meanwhile, according to (Vurall et al., 2024) The average age of patients at the time of evaluation was 16.4 ± 3.7 years and ranged from 10 to 21 years. The average age at diagnosis was 9.6 ± 3.6 years (range 5–17 years), and the average duration of diabetes was 7.0 ± 3.1 years (range 3–14 years). The majority (89%) of patients use multidose insulin therapy, and 11% use insulin pump therapy. The average HbA1c was $8.8 \pm 2.6\%$, and the average total daily insulin dose was 1.0 ± 0.3 IU/kg. There was no difference between boys and girls in terms of age at the time of evaluation, HbA1c levels, duration of diabetes, and daily insulin dose. Of the 128 CHD patients in the age group (50–69 years), the mean blood glucose value of the Atorvastatin group was 123 ± 23 mg/dl, which was significantly higher ($P < 0.0001$) than the blood glucose level (108.3 ± 22.3 mg/dl) of the non-Atorvastatin group. Similarly, the mean HbA1c% ($6.15 \pm 0.8\%$) of the atorvastatin group ($P < 0.0001$) was significantly higher than the average HbA1c (5.52%) of the non-atorvastatin group. Cholesterol, TAG, ALT, and AST were unchanged ($P > 0.05$) in the atorvastatin group compared to the non-atorvastatin group (Myg et al., 2024).

The prevalence of diabetes, hypertension, dyslipidemia (TG/HDL/LDL), and dyslipidemia (TG/HDL) among all participants was 9.7%, 41.0%, 63.8%, and 19.5%, respectively. Diabetes had the lowest prevalence of the three diseases in each BMI category except for the class III obesity group in dyslipidemia (TG/HDL). Dyslipidemia (TG/HDL/LDL) showed the highest prevalence in the underweight, normal weight, and class I obesity groups, while hypertension showed the highest prevalence in the class II and class III obesity groups. The prevalence of diabetes, hypertension, and dyslipidemia (TG/HDL/LDL) increased with increasing BMI, with diabetes and hypertension increasing sharply and dyslipidemia to a lesser extent. The prevalence of dyslipidemia (TG/HDL) also increased with obesity and was more pronounced than dyslipidemia (TG/HDL/LDL). In the analysis by sex, the

prevalence of diabetes, hypertension, and dyslipidemia (TG/HDL) was substantially higher in men than in women, whereas dyslipidemia (TG/HDL/LDL) was slightly but significantly higher in women. The prevalence of diabetes, hypertension, and dyslipidemia (TG/HDL/LDL) increased with increasing obesity in men. However, in women, the prevalence of dyslipidemia (TG/HDL/LDL) peaked in the class I obesity group, whereas dyslipidemia (TG/HDL) increased with obesity (Yamada et al., 2023).

Use of Other Drugs

In addition to DM drugs, it is proven that antihypertensive and dyslipidemic drugs are the most commonly used drugs by prospective pilgrims for the Palembang Embarkation. This is due to the fact that the majority of respondents have dyslipidemia and hypertension as comorbidities (table 2). Amlodipine (53.6%) is the most commonly recommended drug of the antihypertensive therapy class, while simvastatin (64.3%) is the most commonly prescribed drug for dyslipidemia. Among diabetic patients, 47% (n = 53,858) had underlying cardio-renal disease. Diabetic patients with cardio-renal disease are older and receive more antihypertensive and lipid-lowering medications compared to those without cardio-renal disease. Diabetic patients with cardio-renal disease are less likely to experience elevated levels of total cholesterol and triglycerides and are more likely to experience an increase in blood pressure compared to those without cardio-renal disease (Song et al., 2024).

A total of 260,577 hypertensive patients receiving FDC amlodipine/atorvastatin or a free combination of 5 mg amlodipine and 20 mg atorvastatin daily were identified in the NHIRD from January 1, 2016, to December 31, 2019. After exclusion, the remaining 9,095 patients were eligible for further analysis, including 3,313 in the 5/10 fixed group, 2,658 in the 5/20 fixed group, and 3,124 in the 5/20 free group. Diabetes was present in 22.2% of the cohort, and the mean CCI score was 0.9. In the entire cohort, 47.2% of patients received only the study regimen to control hypertension. Meanwhile, 37.5% received one other antihypertensive agent, and 15.3% received >2 other drugs for further BP control. Furthermore, only 0.5% of the entire study population received ezetimibe, and 1.6% received lipid-lowering agents other than statins and ezetimibe. The total number of medications among antiplatelet agents, antihypertensives, oral hypoglycemics, and lipid-lowering agents was 2.6, 2.5, and 3.7 in the 5/10 fixed, 5/20 fixed, and 5/20 free groups, respectively. Compared with the 5/10 and 5/20 fixed groups, patients in the 5/20 free group received more antiplatelet agents and angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (both MASD = 0.25) (Lin et al., 2024).

Comparative efficacy of dual combination therapy on reduction of LDL-C, SBP, and DBP: regarding changes in LDL-C levels, our subgroup analysis showed that patients who received CCB in combination with statins had a much better reduction in LDL-C levels than those treated with statins alone (MD, -8.0; P = 0.0008). However, compared to patients receiving statins alone, changes in LDL-C were not statistically significant for those treated with ARBs combined with statins (MD, -3.98; P = 0.56) and BB combined with statins (MD, -0.47; P = 0.90). On the other hand, we found that regardless of the type of antihypertensive given, patients who received combination therapy had a significant decrease in LDL-C levels compared to those who received antihypertensive drugs alone (P < 0.00001) (Popat & Yadav, 2024).

Compliance Level

The majority of respondents (74.3%) had a moderate level of compliance. These findings suggest that interventions are needed to improve respondents' medication adherence levels.

According to (Purwanti et al., 2024) The duration of illness in patients with type 2 diabetes mellitus did not correlate with the level of dietary compliance in patients with type 2 diabetes mellitus (p=1.000; OR=0.900; 95% CI=0.302-2.685). The OR value <1 indicates that the duration of illness <5 years is a protective factor for the level of dietary compliance. Based on the results of the cross-tabulation, it can

be seen that the level of compliance is higher in patients with a duration of illness <5 years compared to patients with diabetes mellitus with a duration of illness >5 years.

Level of Knowledge

The majority of respondents had poor knowledge (35%) and moderate knowledge (50%), while 15% had excellent knowledge. Respondents' lack of education may be the cause of these findings. According to research (Buyung et al., 2024) The majority of type 2 DM patients at the Kalumata Health Center have a moderate category treatment compliance level of 40 patients (36.7%). This result is relevant to the findings of Masrurroh et al. (2021) in Malang, who stated that the majority of type 2 DM patients have a moderate level of treatment (52%). These results are also relevant to a study by Saibi, Romadhon, and Nasir (2020) at the East Jakarta Health Center, which found that the level of treatment adherence for most patients was in the medium category of 40.6% of patients. The level of treatment adherence is a benchmark of the extent to which patients can follow and adhere to the agreed and planned recommendations of the healthcare provider (Fernandez-lazaro et al., 2019). The majority of type 2 DM patients at the Kalumata Health Center have reached a sufficient level of treatment compliance. However, the proportion of patients with low compliance levels is still significant, so additional intervention measures are needed to address these problems.

According (Mpila et al., 2023) The study assessed quality of life, blood sugar levels, and medication adherence. In addition to achieving the desired blood sugar level of GDP <126 mg/dL or GD2PP <200 mg/dL, most patients showed moderate to high levels of adherence and a high quality of life. Controlled blood sugar levels and the best outcomes from prescribed medications are associated with T2DM patients' adherence to their medications, and these outcomes can result in better health, fewer comorbidities, higher quality of life, lower medical costs, and lower mortality rates. Patient non-compliance is caused by the patient's carelessness in undergoing treatment, forgetting to take medication regularly, stopping taking medication when feeling that it has improved or worsened, side effects of medication, complicated medication rules, low level of education, lack of transportation, low income, and unavailability of a glucometer at home.

Meanwhile, research from (Darantika et al., 2023) showed that the level of patient knowledge, categorized as good, amounted to 50 respondents (50%); moderate, amounted to 42 respondents (42%); and poor, amounted to 8 respondents (8%). All respondents came from a variety of backgrounds, including age, occupation, gender, and education level. These results are in line with the findings of Bastanta and Gaddafi, 2021, which found that 55% of diabetics had good enough knowledge, with a frequency of 33 respondents. This result is also comparable to the findings of Miftahusna (2022), which found that 55.2% of diabetics had good enough knowledge, or 24 people. Respondents with good knowledge related to diabetes do not necessarily have good preventive behaviors, because usually the knowledge they have is not used in daily life. A person's health knowledge will be the basis for disease prevention.

CONCLUSION

Based on the research conducted, it can be concluded that it is important to carry out regular health checks to prevent/avoid the appearance of unwanted diseases and to improve the quality of life for the better.

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