

# The Relationship Between the Blood Sugar History and Severity of Diabetes Mellitus Patients

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**Abstract—Background:** Diabetes belongs to non-communicable diseases which may create many complications. One of the signs and symptoms that often occur in people with diabetes mellitus is itchy sensation in the genitals. Women who suffer from diabetes mellitus more often experience vaginal discharge if the level of glucose in the blood has increased. The purpose of this study was to determine the relationship of blood sugar levels history with the incidence of vaginal discharge in patients with type 2 diabetes in the working area of Sayung 1 Demak health center. **Method:** This type of research is descriptive correlation with retrospective method. Data collection using a seconder with medical report. The total number of respondents using total sampling technique is 169 respondents, the data obtained is then processed using the Spearman rank formula. Based on the analysis results obtained from 169 respondents, it was found that the history of blood sugar levels  $\geq 200$  was 96 respondents (56.8%) while respondents who experienced vaginal discharge were 85 respondents (50.3%). **Conclusion:** There is a significant relationship between history of blood sugar levels with vaginal discharge in patients with type 2 diabetes in Sayung 1 Demak Health Center with p value 0.024 and spearman rank correlation value of 0.174 which shows the strength of the correlation is very weak with a positive correlation direction.

**Keywords:** history of blood sugar levels, leucorrhoea, diabetes mellitus

## I. INTRODUCTION

The prevalence of diabetes in Indonesia tends to increase, which is from 5.7% in 2007, to 6.9% in 2013. Even more astonishing, as released by the Ministry of Health, 2/3 diabetics (designation for sufferers of diabetes) in Indonesia do not know he has diabetes. The age of diabetics in Indonesia is getting younger. Of the 10 million figures, 1.67 million are under 40 years old, 4.65 million are 40-59 years old, while the rest (2 million) are 60-79 years old [24].

Diabetes mellitus (DM) as a metabolic disease that has characteristics of increasing blood glucose levels

(hyperglycemia) is a result of abnormal insulin secretion, insulin action, or both. Glucose is formed in the liver from food consumed and normally circulates in a certain amount in the blood. Insulin is a hormone produced by the pancreas that functions to control glucose levels in the blood by regulating its production and storage [2].

The results of the Riskesdas Survey (2013) found that patients with diabetes mellitus were women in the age range of 35-55 years old. There are some signs and symptoms that often occur in people with diabetes mellitus, one of which is itch in the pubic area, both male and female. Women who suffer from diabetes mellitus tend to experience vaginal discharge if glucose levels in the blood increase [27].

According to Abhishek (2013), 31% of infections in people with DM are caused most often by candida [1]. The condition of epithelial and mucosal cells in DM patients also has increased adhesion to several pathogenic microorganisms such as *Candida albicans* in the mouth and vaginal mucous cells and *Escherichia coli* in urinary tract epithelial cells [34]. Research at Dr Soetomo General Hospital in Surabaya, diabetes mellitus (DM) is a risk factor for the occurrence of intertriginous candidiasis. The average patient with diabetes mellitus is 3.26 times riskier than those without a history of diabetes mellitus [30].

Skin manifestations are found in 30-71% of patients with type 1 and type 2 diabetes mellitus and the most types of skin manifestations in diabetic patients in the Department of Dermatology, Al-Farwaniya Hospital, Kuwait is a skin infection by fungi and bacteria. Research conducted by Foss (2005) found that most types of skin manifestations in diabetic patients at Sao Paulo University Hospital, Brazil are dermatophytosis [9]. According to Mahajan, Kurannedan Sharma (2003), skin infections frequently become skin manifestations followed by vulgaris at Suchetha Kripalani Hospital, New Delhi, India [25].

The study conducted by Oktavia (2014) found the results of the frequency of the incidence of candidiasis and non-candidiasis cutaneous with Diabetes Mellitus or not Diabetes Mellitus. The data obtained in the case of candidiasis known from this study, at the RSUP Dr. Soeradji Tirtonegoro, is more prevalent in people with DM (54%)

compared to non-DM patients (16.6%) [20]. The study conducted by Mehr, A (2012) states that there is a relationship between people with diabetes mellitus and candidiasis cases [16].

A preliminary study of 10 people suffering from type 2 diabetes mellitus was found that 5 people often experience vaginal discharge and itching, 3 people sometimes experience vaginal discharge but do not experience pubic itching, and 2 people never experience vaginal discharge and itching Pubic itching in the last 3 months; all these patients consider that experiencing vaginal discharge is natural, they thought there was no connection regarding DM leucorrhoea, they considered the vaginal discharge was due to exhaustion not because of DM. This study aims to determine the relationship between the history of blood sugar levels and the incidence of vaginal discharge in patients with type 2 diabetes in the working area of Sayung 1 Demak health center.

**II. METHOD**

*A. Research Design*

This study used correlational descriptive that aims to examine the relationship between independent variables and dependent variables using retrospective approach.

*B. Population and Samples*

Population in this study were all DM Patients obtained from three months from May - June 2018 including 169 participants. The sample of this study is the total population with inclusion criteria Type 2 DM patients, recorded routine checks in the last three months.

*C. Data Colleting and Analysis*

The data were taken based on the patient's medical records in the past 3 months and then analyzed by using the Spearman rank formula.

**III. RESULTS**

*A. Characteristic's of Respondents*

**1. Age**

TABLE I. RESPONDENT FREQUENCY DISTRIBUTION BASED ON AGE OF TYPE 2 DM PATIENTS AT SAYUNG I DEMAK HEALTH CENTER.

No	Ages	Frequency	Percentages (%)
1	35-45	24	14,2
2	46-55	80	47,3
3	>55	65	38,5
Total		57	100

**2. Education**

TABLE II RESPONDENT FREQUENCY DISTRIBUTION BASED ON EDUCATION OF DM TYPE 2 PATIENTS AT SAYUNG I DEMAK HEALTH CENTER.

No	Education	Frequency	Percentages (%)
1	No	22	13,0
2	Education	76	45,0
3	School	56	33,1
4	Elementary Junior high Senior High	15	8,9
Total		169	100

**3. Work**

TABLE III RESPONDENT FREQUENCY DISTRIBUTION BASED ON OCCUPATIONS OF DM PATIENTS TYPE 2 AT SAYUNG I DEMAK HEALTH CENTER.

No	Occupation	Frequency	Percentages (%)
1	Jobless	1	6
2	IRT	106	62,7
3	Businessman	57	33,7
4	Fisherman	5	3,0
Total		169	100

**4. Historical Organ Disease History**

TABLE IV FREQUENCY DISTRIBUTION OF RESPONDENTS BASED ON HISTORICAL DISEASE OF PATIENT TYPE DM TYPE 2 IN PUSKESMAS SAYUNG I DEMAK.

No	Disease History of Uterus	Frequency	Percentages (%)
1	Absent	169	100
Total		169	100

**5. Use of contraceptive devices**

TABLE V. RESPONDENTS' FREQUENCY DISTRIBUTION BASED ON THE USE OF CONTRACEPTION METHOD FOR DM TYPE 2 PATIENTS AT THE SAYUNG I DEMAK HEALTH CENTER.

No	Contraception use	Frequency	Percentages (%)
1	No	71	42,0
2	KB	84	49,7
3	Injection	2	1,2
4	Implant	11	6,5
5	IUD MOW	1	0,6
Total		169	100

*B. Univariate Variable Analysis*

**1. History of blood sugar levels**

TABLE VI. RESPONDENT FREQUENCY DISTRIBUTION BASED ON HISTORY OF BLOOD SUGAR LEVELS IN TYPE 2 DM PATIENTS AT SAYUNG I DEMAK HEALTH CENTER.

No	Blood sugar history	Frequency	Percentages (%)
1	<200	73	43,2
2	≥200	96	56,8
Total		169	100

**2. Leucorrhoea**

TABLE VII RESPONDENT FREQUENCY DISTRIBUTION BASED ON LEUCORRHOEA OF DM TYPE 2 PATIENTS AT SAYUNG I DEMAK HEALTH CENTER.

No	Leucorrhoea	Frequency	Percentages (%)
1	Yes	85	50,3
2	No	84	49,7
Total		169	100

*C. Bivariate Analysis*

TABLE VIII. RELATIONSHIP BETWEEN HISTORY OF SUGAR LEVELS WITH LEUCORRHOEA IN PATIENTS WITH TYPE 2 DM AT SAYUNG 1 HEALTH CENTER 1 DEMAK

Blood Sugar History	Leucorrhoea				Total	%
	Yes		No			
	N	%	N	%		
≥200	44	60,3	29	39,7	73	100
<200	41	42,7	55	57,3	96	100
Total	85		84		169	100

In table 4.9 of 169 respondents found that respondents with blood sugar levels of  $\geq 200$ mg / dl were as many as 44 respondents (60.3%) and respondents with blood glucose  $\geq 200$ mg / dl who did not suffer from whiteness were 29 respondents (39.7%), respondents with blood glucose level  $< 200$ mg / dl were 41 patients (42.7%), and respondents with blood glucose level  $< 200$ mg / dl who had no whiteness were 55 respondents (57, 3%).

TABLE IX. RELATIONSHIP OF BLOOD SUGAR HISTORY WITH TYPE WHITENESS OF DM TYPE 2 PATIENTS IN PUSKESMAS SAYUNG 1 DEMAK. APRIL-JUNE (N = 169)

		Keputihan	
Riwayat	R		0,174
Kadar Gula	p		0,024
Darah	N		169

Based on table 4.10 the results of the analysis of the relationship between history of blood sugar levels with vaginal discharge in DM type 2 patients at Sayung 1 Demak Health Center showed that the results obtained significance 0.024 (p value  $< 0.05$ ) which showed that the correlation between the relationship between history of blood sugar levels with vaginal discharge in type 2 DM patients at Sayung 1 Demak Health Center is meaningful. The value of the Spearman rank correlation is 0.174 which indicates that the strength of the correlation is very weak with the direction of the positive correlation.

IV. DISCUSSION

A. *History of Blood Sugar Levels*

The history of blood sugar levels is an independent variable in this study, which aims to determine the relationship of history of blood sugar levels with vaginal discharge in patients with type 2 diabetes in Sayung 1 Demak Health Center. A history of blood sugar levels of type 2 DM patients at Sayung 1 Demak Health Center with blood sugar levels  $< 200$  are as many as 73 respondents (43.2%) and a history of blood sugar levels  $\geq 200$  are as many as 96 respondents (56.8%).

The research conducted by Amalia (2009) found that 53 people whose blood sugar levels were in the normal range (90-134 mg / dl) and there were Candida (-) were 31 people, whose blood sugar levels were in the range above normal (135-  $< 200$  mg / dl) and there were Candida (+) in 19 people, and there are 3 people whose blood sugar levels are in the range above normal (135-  $< 200$  mg / dl) and there were Candida [3].

Candidiasis usually occurs in women who have increased estrogen levels. Therefore, it most often occurs in reproductive age and during pregnancy, when using antibiotic and corticosteroid drugs, suffering immunocompromise, diabetes mellitus, HIV infection; it is a predisposing factor [14].

Increased glucose levels in the blood, tissues, and urine causes vulvovaginitis. The onset of vulvovaginitis is caused by the vulva doused by urine which contains high sugar content. This causes the vulva to be a good place for

Candida albicans growth, so the frequency of colonization becomes higher (Darmini, 2003 in Amelia 2009). The results of this study are in accordance with the results of previously mentioned studies; an increase in blood sugar levels and also an increase in estrogen hormone triggers the growth of candida fungi.

B. *Leucorrhoea*

Leucorrhoea variables from this study, respondents with leucorrhoea category in type 2 DM patients at Sayung 1 Puskesmas 1 Demak as many as 85 respondents (50.3%) experienced vaginal discharge while 84 non-vaginal respondents (49.7%) experienced vaginal discharge.

The results of research conducted by Basri (2014) showed that 77 samples of patients were with albus flour, 31 people had physiological albus flour with a percentage of 40.3% and 46 people with albus pathology with a percentage of 59.7%. Candida albicans is a normal flora in some areas of the human body and has an opportunistic nature so that if conditions support, it can turn into a pathogen [17].

Candida albicans infection in the vagina, more often called vaginal candidiasis, generally affects women aged 25-44 years, especially those who are married. From the study it was reported that in Karyadi General Hospital, Semarang in the period January 1990 - December 1994, vaginal candidiasis was second only to nonspecific vaginitis [34].

Vulvovaginitis by Candida or vaginal candidiasis often occurs in people with diabetes mellitus due to high blood and urine sugar levels, as well as in pregnant women due to glycogen accumulation in the vaginal epithelium [14]. Based on the theory and previous research it can be concluded that vaginal discharge or candida infection often attacks women aged 25-44 years and is affected by high sugar levels and can also occur if conditions support to vaginal discharge occurs.

C. *Relationship to History of Blood Sugar Levels with Leucorrhoea*

Based on the results of statistical tests using spearman rank analysis, the results of an analysis of the relationship between history of blood sugar levels and vaginal discharge in type 2 DM patients at Sayung 1 Demak Health Center showed that the results obtained significance 0.024 (p value  $< 0.05$ ), indicating that correlation the relationship between history of blood sugar levels and vaginal discharge in type 2 DM patients at Sayung 1 Demak Health Center was significant. The value of the Spearman rank correlation is 0.174 which indicates that the strength of the correlation is very weak with the direction of the positive correlation. According to Sopiudin (2015) in the interpretation guide the hypothesis test correlation explained the correlation strength statistically with a correlation value of 0.0 -  $< 0.2$  said the correlation strength was very weak and the significance value or p value  $< 0.05$  showed a significant correlation. So it can be interpreted that there is a significant relationship between the history of blood sugar levels and vaginal discharge in patients with type 2 diabetes in Sayung 1 Demak Health Center but the correlation strength is very weak [33].

Based on the cross section results of 169 respondents, it was found that respondents with a history of blood sugar levels  $\geq 200$  mg / dl who experienced vaginal discharge were 44 respondents (60.3%) and respondents who had a history of blood sugar levels 200 mg / dl who did not experience vaginal discharge were 29 respondents (39.7%), while respondents who had a history of blood sugar levels  $< 200$ mg / dl who experienced vaginal discharge were 41 respondents (42.7%) and respondents who had a history of blood sugar levels  $< 200$ mg / dl who had no vaginal discharge were 55 respondents (57.3%).

In hormonal contraceptive acceptors there are likely to be physiological changes in the body. One of these physiological changes is increased hormonal levels, especially estrogen and progesterone in the blood. High levels of estrogen and progesterone facilitate the growth of yeast cells [13]. Disorders of carbohydrate metabolism cause blood sugar levels and glycogen levels in the vaginal epithelium to rise. As a result, the vaginal pH becomes low so that the Candida fungus can thrive [3].

The research conducted by Amelia (2009) explained that in addition to the findings above, vaginal hygiene that is poorly maintained and a diet that contains a lot of glucose may also be the background for the discovery of Candida fungi. This causes a change in atmosphere or humidity in the vagina so that bacteria and fungi that initially are only normal flora, over time develop into pathogens.

Whereas the research carried out by Basri, 2014 found that, the distribution of samples with blood sugar levels at normal (not at risk of gestational diabetes mellitus) and those at each risk of 72 people and 5 people with a percentage of 93.5% and 6.5%, there was no the relationship between blood sugar with fluor albus in pregnant women aged 13-40 weeks in Prikasih Pondok Labu Hospital. That research findings contradict the results of the research conducted by Amelia (2009) that there is a significant and close relationship between blood sugar levels and the incidence of vaginal candidiasis in hormonal contraceptive acceptors with Chi Square Test with significance level ( $\alpha$ ) = 0, 05; can be seen  $\chi^2$  count = 41,734 and  $\chi^2$  table = 3,841. Because  $\chi^2$  count is greater than  $\chi^2$  table,  $H_0$  is rejected and  $H_1$  is accepted, meaning there is a relationship between blood sugar levels and vaginal candidiasis in hormonal contraceptive acceptors.

The results of the study, related to theory and previous research presented in the previous paragraph history of blood sugar levels affect the occurrence of vaginal discharge, show that there is a significant relationship with the value of the strength of the correlation is very weak with a direction of positive correlation, but many other factors influence the occurrence vaginal discharge such as the use of contraceptives, work, tiredness, cleanliness of genital devices etc.

#### V. CONCLUSION

Based on the conducted research, it can be concluded as follows: Pulmonary tuberculosis occurs in the work area of Kaliwungu Kudus Community Health Center with 40

respondents, the largest percentage in primary education was 88.2%, while in the low economic status  $< \text{UMK}$  was 88.2%. There is a relationship between education and the incidence of pulmonary TB in Kaliwungu Kudus Health Center in 2017 with a value of 0.039  $< 0.05$ . There is a correlation between economic status and the incidence of pulmonary TB in Kaliwungu Kudus Health Center in 2017 with a value of 0.039  $< 0.05$ .

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