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Original Research Article

Impact of pharmacist counseling on the clinical outcomes in the management of type 2 diabetes mellitus outpatients admitted to a hospital

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ABSTRACT

Background: Type 2 Diabetes mellitus remains a global health problem due to its poor clinical outcomes, high morbidity, and mortality caused by many complicated problems, one of which is the ineffective role of pharmacists in providing counselling to DM patients
Methods: This pre and post cohort study analyzed the impact of pharmacist counselling on the blood glucose level and glycosylated hemoglobin (HbA1C) of T2DM outpatients (n=88) admitted to Asahan General Hospital period June to December 2022. Counselling provided comprised the importance of medication adherence and non-pharmacological approaches. Characteristics, BGLs and HbA1C of the patients were extracted from their medical records before and after counselling using a predetermined questionnaire. Characteristics of the patients were descriptively analyzed.
Results: The significance of the counselling on these outcomes was analyzed by applying Wilcoxon test ($p < 0.05$ was considered significant). The mean age of the patients was 57.89±9.75 (years). Most (57.95%) of them were female. Proportion of the patients with controlled BGLs (%): before counselling, 27.7; after counselling, 89.8. Proportion of the patients with controlled HbA1C (%): before counselling, 27.3; after counselling, 89.8. Pharmacist counselling significantly improved the clinical outcomes of T2DM patients, p=0.000.
Conclusions: Pharmacist counselling plays an important role to improve BGLs and HbA1C in T2DM patients which can finally improve their quality of life.

Keywords: Counselling, T2DM patients, BGL, HbA1C

INTRODUCTION

Type 2 Diabetes mellitus (T2DM) remains a global health threat due to its poor clinical outcomes, high morbidity, and mortality caused by many complex problems. It affects a large number of people worldwide and is a global health emergency. A study conducted in 2021 found that the numbers of people with DM living in urban and rural areas were 360.0 million and 176.6 million, with estimated prevalences of 12.1% and 8.3%, respectively. It was predicted that the number of people with DM living in urban areas will increase to 596.5 million in 2045. Due to their low social acceptance, people with DM tend to develop other diseases, such as psychological disorders, blood vessel issues in the brain, gangrene, heart disease, and kidney failure.[1]

In Indonesia, with a population of 179.72 million, the prevalence of diabetes was 10-60%. Diabetes Mellitus is a disease that can kill 6.7 million people, or it can be said that 1 sufferer is killed every 5 seconds. Indonesia was ranked as the fifth highest country with DM patients.[2] Controlling hypertension, cholesterol, and blood lipid levels is crucial in preventing cardiac issues since patients with diabetes have a high risk of developing heart disease. These patients are therefore required to adopt deliberate lifestyle changes, such as attempting to have an ideal body weight, engaging in regular physical activity, eating a balanced diet, quitting smoking, and managing stress.[3] It is hoped that the management of T2DM necessitates intervention targeted at managing glycemia and risk factors for the heart and blood vessels because there are so many chronic problems caused by T2DM that fatally harm many important organs.[4]

The increasing number of DM sufferers in Indonesia cannot be separated from the roles of the patients themselves and healthcare providers. Maintenance of a stable BGL is the most important thing to do for a patient with DM to avoid from further complications. Actions taken to help improve the effectiveness of DM treatment require the active role of healthcare providers, including pharmacists. Efforts to improve the quality of life of patients with DM can be pursued by providing guidance or counseling. Counseling also helps patients with DM monitor their BGLs. Pharmacist consultation at the hospital is an influential factor in increasing fasting blood glucose (FBG) and glycosylated hemoglobin A1 (HbA1c) levels for individuals with T2DM.

The goal of counselling is to increase the efficacy of therapy so that people with DM can take their medications safely and effectively, adhere to their medication regimens, and readily attain therapeutic goals.[5] The advantage of counselling is that by having face-to-face encounters with patients, healthcare providers (pharmacists) can share detailed information about the patient's clinical condition, the medications provided to them, and how to cope with the disease suffered by the patient.[6] Rational therapy in controlling DM can improve the achievement of targeted clinical outcomes, namely controlled BGLs and HbA1c. Other factors, such as lifestyle and patient education, have an impact on the clinical outcome in patients with DM, which is the achievement of controlled BGLs. Lifestyle is significantly related to the clinical outcome of DM patients. A well-controlled DM occurs when BGLs, lipid levels, HbA1c, and blood pressure reach the expected levels. The clinical outcome is a picture of the patient's clinical response related to the success of anti-diabetic therapy, which can be in the form of a fasting blood glucose level (FBGL).[7] This present study aimed to analyze the impact of pharmacist counselling on the improvement of BGL and HbA1C of patients with T2DM admitted to Asahan Regional General Hospital, Province of Sumatera Utara, Indonesia.

METHODS

This pre and post cohort study analyzed the impact of pharmacist counseling on the blood glucose level (BGL) and glycosylated hemoglobin (HbA1C) of T2DM outpatients (n=88) admitted to Asahan General Hospital period June to December 2022. In this study, all outpatients with T2DM admitted to Asahan General Hospital, Province of Sumatera Utara, Indonesia period June to December 2022 and met the inclusion criteria were included as study sample (n=88).

Inclusion and exclusion criteria

The inclusion criteria were T2DM patients with and without complications and comorbidities, age of 18 years or older, had no mental disorders, received at least one antidiabetic drug, and agreed to sign the informed consent. The exclusion criteria were T2DM patients infected with human immunodeficiency virus and tuberculosis. Characteristics of the patients including gender, age, education, occupation, disease duration, comorbidities, complications, and diagnosis were collected using a predetermined questionnaire. BGLs and HbA1C of the patients were collected before, during (follow-up I and II), and after the pharmacist counselling. Counselling provided to the T2DM patients focused on the importance of adherence to the prescribed medications and non-pharmacological approaches to improve their clinical outcomes. Characteristics of the T2DM patients were analyzed by applying descriptive statistics. The significance of counselling on the BGL and HbA1C improvement was statistically analyzed by applying the Wilcoxon test ($p>0.05$ was considered significant).

RESULTS

Patient characteristics

The target population of this study was all T2DM outpatients (n=113) admitted to the Asahan Regional General Hospital period June to December 2022. Of the 113 patients, only 88 met the inclusion criteria. These patients were then recruited as the study sample. Characteristics of the T2DM patients in this study included gender, age, education, occupation, duration of T2DM disease, comorbidities, complications, and disease diagnosis are presented in (Table 1).

Blood glucose level of the patients

Differences of BGLs of the T2DM patients before, during, and after the counselling can be seen in (Table 2). As shown in (Table 2), less than one-third (27.27%) of the patients had controlled BGL. In the follow-up I, as many as 39 (44.3%) of the patients had controlled BGLs and more than half (55.7%) of the patients were uncontrolled. In follow-up II, as many as 72 (81.8%) of them had controlled BGLs and as many as 16 (18.2%) were not controlled.

Table 1: Characteristics of the T2DM patients (n=88).

Patient characteristics		N	%
Gender	Male	37	42.05
	Female	51	57.95
Age (years)	≤30	1	5.68
	31-40	4	17.05
	41-50	15	35.23
	51-60	31	36.36
	>60	37	5.68
	Mean	57.89±9.75	
Education	Primary school	28	31.82
	Junior high school	16	18.18
	Senior high school	37	42.05
	University	7	7.95
Occupation	Housewife	37	42.05
	Civil Servant	10	11.36
	Self – employed	19	21.59
	Employee	11	12.50
	Others	11	12.50
Duration of suffer from DM (years)	0-1	12	13.64
	1-5	32	36.36
	5-10	26	29.54
	10-20	15	17.05
	20 -30	3	3.41
	Mean	7±6.08	
Comorbidities	With co-morbidities	86	97.73
	Without co-morbidities	2	2.27
Complications	With complications	88	100
	Neurological complications	66	75
	Ketoacidosis	22	25
	No Complications	0	0
Diagnosis	Insulin-dependent DM with neurological complications	18	20.45
	Insulin dependent DM with Ketoacidosis	12	13.64
	Non-Insulin dependent DM with neurological complications	48	54.55
	Non-Insulin dependent DM with Ketoacidosis	10	11.36

Table 2: Differences in BGLs of the patients with T2DM (n=88) before, during, and after counselling.

Category of BGL		BGL (mg/dl)							
		Pretest	Mean	Follow up I	Mean	Follow up II	Mean	Postest	Mean
Controlled	F	24	165.29±8.05	39	165.69±9.58	72	165.31±13.06	79	152.80±10.34
	%	27.3		44.3		81.8		89.8	
Not Controlled	F	64	254.95±50.21	49	239.33±40.90	16	254.13±47.47	9	234.78±27.44
	%	72.7		55.7		18.2		10.2	

Table 3: Proportion of the T2DM outpatients by HbA1C before and after counselling (n=88).

Category of HbA1C	Before counselling			After counselling		
	N	%	Mean HbA1C	N	%	Mean HbA1C
Controlled	24	27.3	6.06±0.34	79	89.8	5.94±0.33
Uncontrolled	64	72.7	8.52±1.19	9	10.2	8.81±1.10

Glycosylated hemoglobin (HbA1C)

The HbA1C values of T2DM patients can be seen in Table 3. Before counseling, as listed in (Table 3), it was known that patients with controlled HbA1C were only 24 (27.3%) with a mean of HbA1C 6.06±0.34 and uncontrolled as much as 64 (72.7%) with a mean HbA1C of 8.52±1.19. After counseling, most (89.8%) of the patients with T2DM had controlled HbA1C with a mean HbA1C of 5.94±0.33. whereas patients with uncontrolled HbA1C were only 9 or 10.2% with a mean HbA1C of 8.81±1.10. The present study indicated that the mean HbA1C value was 8.06±1.60 (%) in the pretest stage, and in the post test it decreased to

6.2±0.98 (%). Wilcoxon test conducted indicated that the p value was 0.000.

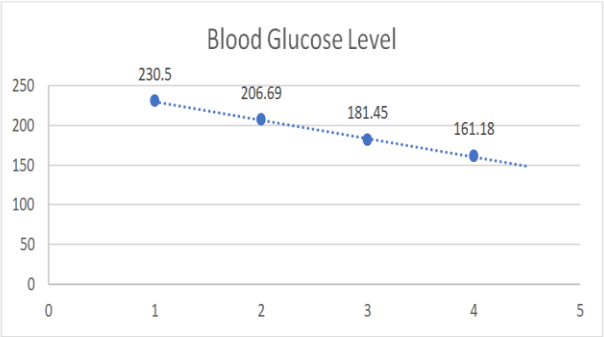

Figure 1: Blood glucose levels.

DISCUSSION

As shown in (Table 1), the majority (57.95%) of the T2DM patients were female. More than one third (35.23%) of them was at the age range of 51 to 60 years. Most (42.05%) of them graduated from high school. Subsequently, as much as 42.05% of the patients were housewives. Most (36.36%) of them and have suffered from T2DM for 1 to 5 years. In addition, most (97.73%) of the patients had comorbidities and complications. Most (54.55%) of them were diagnosed as non-insulin dependent DM with neurological complications. Characteristics of T2DM patients vary widely across countries. A three-month cross-sectional study conducted in Saudi Arabia found that most (87.9%) of the patients were male. They had lower proportion of comorbidities (46.2%) compared to this present study.[8]

In general, only 24 (27.7%) of the patients had controlled BGLs before the counselling with a mean value of 165.29±8.05 mg/dl. Most (72.73%) of them had uncontrolled BGLs with a mean value of 254.95±50.21. In contrast, the present study proved that the number of patients with T2DM outpatients with controlled BGLs increased up to 79 (89.9%) after the counselling. The term "blood glucose level" (BGL) refers to the blood's tightly controlled glucose levels. The BGL is tightly regulated in the body. Glucose flowing through the blood is the main source of energy for the body's cells.[9]

Suyono, in the management of integrated DM, argued that DM patients showed that the reduced amount of insulin is not of good quality. So, even though there are insulin and receptors, due to abnormal cells occurring, glucose cannot enter because all the cell doors are closed, so glucose cannot be metabolized within the cells. This is what makes BGL rise, which is the cause of hyperglycemia.[10] Monitoring of BGLs is of important to diagnose diabetes mellitus.[9] Blood glucose levels can be evaluated when the patient is in a fasting state or when the patient comes to be checked, with the results of BGLs when >200 mg/dl, while the results of glucose levels when fasting are >126 mg/dl.[11]

As presented in (Figure 1), the mean BGL was 230.5 mg/dl at the pretest, dropped to 206.69 mg/dl in follow-up I, dropped to 181.45 mg/dl in follow-up II, and dropped to 161.18 mg/dl in the post-test. It showed that the mean BGL decreased after the counselling. These findings proved that pharmacist role to provide counselling is crucial to improve the patients' clinical outcomes.

On the clinical outcome of HbA1C, Wilcoxon test conducted indicated that the p value was 0.000 <0.05. These results indicated that there was a significant difference in the means of HbA1C before and after counselling. This finding implied that pharmacist counselling is important to normalize HbA1C. HbA1C is an accurate and precise measure for chronic BGLs and positively correlated with the risk of diabetes complications. HbA1c has several advantages over plasma glucose. The diagnosis is established if the HbA1c value is ≥6.5%.[12] This is a laboratory examination that can be used in all types of diabetes mellitus, especially to determine long-term glycemic status, because the results are very accurate.[13]

This present study supported several similar studies conducted elsewhere. Hening et al conducted a quasi-experimental study entitled "effect of hospital pharmacist counselling on clinical outcomes of type 2 diabetes mellitus outpatients" in a secondary hospital in Indonesia period April to October 2018. They found that BGL and HbA1C improved significantly in the intervention group compared to those without intervention ($p<0.001$).[14] A more recent pre and post cohort study undertaken on T2DM patients in Sakaka, Saudi Arabia period April to October 2021 also argued that pharmacist-based intervention significantly improved HbA1C of the T2DM patients ($p<0.05$).[15] The present study was limited by the relatively small sample size and short study period.

CONCLUSION

The present study indicated that most of the T2DM patients were female. There were significant differences in terms of BGLs and HbA1C before and after counselling. Pharmacist counselling plays an important role to improve BGLs and HbA1C in T2DM patients which can finally improve their quality of life. Counselling should be routinely practiced in the management of patients with T2DM.

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