ORIGINAL ARTICLE

THE EFFECT OF SHORT MESSAGE ON MEDICATION ADHERENCE AND BLOOD GLUCOSA CONCENTRATE (BGC) VALUE AMONG TYPE II DIABETES MELLITUS (DM) PATIENTS

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Abstract. Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia. Type 2 DM management is education, diet regulation, drug therapy, physical exercise, and routine check of BGC to prevent complications from improving the quality of life of patients. The study aimed to examine the effect of short messages on medication adherence and control of BGC values in type 2 DM patients. This type of research is a quasi-experimental design, pretest, and posttest with a non-equivalent control group that was applied in this study. The research was conducted at Bromo Medan Health Center. Samples were all type 2 diabetes mellitus patients who were controlled to Medan Bromo Puskesmas for 84 people who were divided into two groups, namely the intervention and control groups. The data collection tool uses a questionnaire. The test used was the Wilcoxon test and the Mann Whitney test. The results showed that the short message was significantly (p <0.05), giving a compliant effect on the rules of taking medication and controlling the BGC value compared to patients with type 2 DM who did not send short messages. This study concludes that quick message delivery effectively improves medication adherence and controls BGC values to enhance the quality of life of patients with type 2 diabetes. This study recommended family members to remind for controlling blood glucose levels. An SMS reminder activity program also needs to conduct while implementing the plan.

Keywords: short message, medication adherence, blood glucose concentrate, type 2 diabetes mellitus

INTRODUCTION

Type 2 diabetes mellitus is one of the degenerative diseases, which related to human behavior. Behavior modifications were effective strategies to reduce mortality and improve quality of life by regular medication adherence, diet regulation, physical exercise, monitoring of blood glucose, and foot care (1).

Adhere in medication is an effective strategy to achieve therapeutic success and maintaining the blood glucose target for DM diseases. Several determinants of medication adherence were associated with healthcare providers’ factors, including the level of knowledge, length of work, frequency of counseling conducted (2). The previous study found that health workers have a crucial role in increasing diabetes knowledge to improve patients’
compliance with diabetes regiment (3-4). Health workers also have a positive effect on increasing self-awareness to improve medication adherence in DM care (3).

The Healthy Indonesia Program in 2015 to 2019 period has focused on controlling Non-Communicable Diseases (NCD) by early detection of risk factors as well as integrated with improving the accessibility of NCD services at first-level health facilities (5). Education and counseling also were provided to enhance the knowledge and skill to control blood glucose levels (6).

To effectively monitor and increase the accessibility of health care services, the practical strategy through short Message Service becomes a strategy. High flexibility and accessibility support by using the Message Service (SMS) reminder may improve public health facilities (7).

The previous study showed that intervention using SMS cell phones (8) has a positive effect on improving patients' adherence to Diabetes management. Another study also discussed the importance of the SMS method to improves the self-management of DM patients (9). Even though this strategy is essential for controlling blood glucose levels, a limited number study to examine the actual effect of short Message Service for diabetes controlling. This also occurred at Bromo Health Center. My preliminary survey showed that some of the patients did not take healthcare services and not adhere to attending the diabetes program(10). Therefore, this study focused on the effect of Short Message on Medication Adherence and Blood Glucose Concentrate (BGC) Value among Type II Diabetes Mellitus (DM) Patients

**METHOD**

We applied quasi-experimental study design, pre-test, and post-test with the non-equivalent control group. Eighty-four total samples were recruited and divided into an experimental group (n=42) and the control group (n=42). The samples were recruited using a purposive sampling technique. The inclusion criteria of this study as follows: 1) has been diagnosed as type 2 diabetes mellitus by physician, 2) willing to participate in this study, 3) aged range between 40 and 60 years old, 4) patients beyond of Bromo Health Center in Medan, and 4) Own a private cell phone. Patients who develop severe complications were excluded from this study. Moreover, patients who did not complete the intervention were drop out.

The intervention group received mentoring strategies by SMS five times a week. The program consisted of education and counseling sessions regarding diabetes and procedures to control blood glucose levels. Moreover, the researcher also addresses the barriers and helps to solve the problems, whereas the control group received the routine services.

Medication adherence was measured by Medication Adherence questionnaires (11). This questionnaire was developed based on Indonesian Endocrinology Association medication therapy with Cronbach’s alpha was 0.851. Therefore, it was considered a reliable questionnaire. The blood Glucose Concentrate (BGC) Value was measured by using a glucometer. This instrument was the standard method for assessing the blood glucose level.

This study has been approved by ethical approval from the faculty of public health Universitas Sumatera Utara. Before data collection, all respondents received information about the research objectives, implementation procedures, time, and benefits of the study. Informed consent should be obtained for patients who willing to participate in this study.
The data were analyzed by using the Wilcoxon test and Mann Whitney test to determine the mean differences within and between groups.

RESULT

Distribution of Patients Based on Drug Compliance Score and BGC Value

Table 1 showed the distribution of Patients Based on Drug Compliance Score and BGC Value Before and After receiving Short Message Delivery among the experimental group and control group. The findings after receiving the program, 78.6% of patients in the experimental group has followed medication adherence. While in the control group showed 69% adhere to medication taking. Regarding the blood glucose level, 38.1% of patients in the experimental group has a normal level of blood glucose. Only 19% of patients in the control group in the regular line.

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<td>Taking Medication</td>
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<td>1.</td>
<td>Obey</td>
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<td>23,8</td>
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<td>2.</td>
<td>Not Obey</td>
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<tr>
<td>Total</td>
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<td>42</td>
<td>100</td>
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<tr>
<td>2.</td>
<td>BGC Value</td>
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<td>.100-199 mg/dl (dbn)</td>
<td>6</td>
<td>14,3</td>
<td>7</td>
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<td>. &gt; 200 mg/dl (me ↑)</td>
<td>36</td>
<td>85,7</td>
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Mean differences in medication adherence and blood glucose level before and after receiving program among the experiment group and control group

Table 2 showed Mean differences in medication adherence and blood glucose level before and after receiving the program among the experiment group and control group. The results showed that The intervention group showed that there were differences between before and after health education about DM disease and SMS assistance on drug compliance (difference in mean 1,71; p <0.05) and BCG value (difference in mean 13,6; p <0.05). The control group showed that there was no difference between before and after health education about DM disease on drug compliance (difference in mean 0,02; p >0,05) and BCG value (difference in mean 4,6; p >0,05).
DISCUSSION
The difference in Drug Compliance Score and BGC Value Before and After Health Counseling About DM and Short Message Delivery in Intervention Groups and Control Groups

Based on the Wilcoxon test, the intervention group before and after being given health education about DM and short message delivery showed a difference in the mean value of medication adherence 1.60 before sending a short message and a mean value of 3.31 after health education about DM and message delivery short (p = 0.001 or p < 0.05) with a mean difference of 1.71.

The results were consistent from Adikusuma, and Qiyaam showed the valid SMS sending on medication taking among type 2 DM patients (12). The results of research by Lubis, Harjoko, and Dewi, stated that the use of an SMS reminder system application could be recommended as one of the strategies to improve treatment compliance of DM patients because after the system delivery intervention showed an increase in visiting DM patients to the clinic (13). Consistent with the previous study by Susanto et al. demonstrated the effectiveness of SMS sending was a positive effect on medication adherence among patients with type 2 diabetes. Medicine after the SMS delivery intervention about taking medicine (14).

Based on the Wilcoxon test, after receiving health counseling and short message delivery, patients in the intervention group was a positive effect than before receiving the program.

This study was consistent with the previous study confirmed that after receiving health counseling and short message delivery, medication adherence and blood glucose level were positive effects than before receiving the program (12). The results of the research by Silina et al. found a statistically significant decrease in BGC after sending SMS about health care (15).

The monitoring of BGC values is useful in controlling blood glucose levels. From the results of this study, it can be concluded that the monitoring of BGC values in someone with DM must be carried out routinely so that it can be prevented from increasing the value of BGC, which can increase at any time.

The difference in Drug Compliance Score and BGC Value After Health Counseling About DM and Short Message Delivery in Intervention Groups and Control Groups

Education and counseling can be improved with mentoring activities supported through the Healthy Indonesia Program with Family Approach in the 2015-2019 period. Mentoring is an activity that is carried out and can mean coaching, teaching, the direction in groups that are more connoted to mastering, controlling, and controlling (6). One method of education is through mentoring models with the use of mobile phones. High flexibility and
accessibility support the importance of cellular phone use in improving public health, especially through Short Message Service (SMS) reminders (16).

Based on the Mann Whitney test, it showed that there were differences after health counseling about diabetes mellitus and short message delivery to medication adherence in the intervention group and after health education about diabetes mellitus in the control group at Bromo Medan Health Center (mean rank after intervention > 10; p < 0.05).

Research on the effect of health education through SMS on adherence to taking antidiabetic drugs by Adikusuma and Qiyaam, (12) who took medication adherence measurements in type 2 DM patients who had received oral antidiabetic drug therapy ≥ 6 months by sending SMS every day for 30 days about taking antidiabetic medication, showed a difference in the increase in medication adherence between the intervention group and the control group that did not receive SMS delivery. The results showed similarities with the results of research by wiliyem (17) who measured compliance with oral antidiabetic drugs in type 2 DM patients by sending SMS every day for 30 days about taking medication between the intervention group and the control group, showed that there was a difference in the increase in medication adherence in the intervention group who received an SMS sending about taking medication and a control group that did not receive an SMS sending about taking medication (18).

Based on the results of the study it can be concluded, sending a short message about the regulation of taking medication can help type 2 DM patients to take regular antidiabetic drugs, that is correct medication, correct dose, correct way, right time. and minimize the incidence of forgetting to take medication (19).

Based on the mann whitney test, there were no differences after health education about diabetes mellitus and short message delivery to the control of BGC values in the intervention group and after health education about diabetes mellitus in the control group at Bromo Medan Health Center (mean rank after intervention < 10; p > 0.05) (20).

Research on the relationship of lifestyle modification and adherence to diabetic drug consumption with Blood Sugar Levels (BGC) by Toharin, Cahyati, and Zainafree, states that the importance of guidance and counseling on DM patients about physical exercise, diet regulation, smoking cessation, drug use antidiabetic and side effects, as well as the importance of controlling blood sugar and increasing information about DM, complications, and countermeasures to achieve optimal health in patients with type 2 diabetes (19,21,22).

The results of this study can be concluded that health education about diabetes mellitus and sending short messages to the decline or control of BGC values will be related to many things, namely management or management of DM disease must all be obeyed without exception by DM patients, where all pillars affect the control of BGC values.

CONCLUSION

In conclusion, there are significant effect of short message on medication adherence and blood glucosa concentenate value among type ii diabetes mellitus patients

REFERENCES

EFFECTIVENESS-OF-A-DIABETES-SELF-MANAGEMENT-FOR-Chang-Lin/a05b71c678d679cefc41c4017942906eb2eddc3d


18. Wilieyam, & Sevani GN. Short Massage Service (SMS) Based Gateway Patient Medication Reminder Application. INKOM. 2013; 7(1): 11-20