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Effects of Short-message Notifications on Type 2 Diabetes Management in Middle-aged Turkish Patients: A Randomized Trial

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To the Editor,

Patients with type 2 diabetes mellitus (T2DM) have a management plan that aims to improve their health and quality of life by changing their lifestyle, keeping their glycemic control as close to normal as possible, ensuring their regular pharmacological treatment adherence, and preventing diabetic complications. This study aimed to determine the role of short-message (SMS) technology in raising awareness of medication adherence (MA), physical activity (PA), fasting blood glucose (FBG), and glycated hemoglobin A (HbA1c) readings. This single-blinded, randomized, controlled study included 69 patients, which initially began with 125 patients (SMS group n = 65 and control group n = 60). Of these 69 patients, 43 (20 [46.5%] males and 23 [53.5%] females) were randomized to the SMS group (intervention group) and 26 (14 [53.8%] males and 12 [46.2%] females) were present in the control group who completed their third controls at 6 months. Using the G-power program in the analysis of variance axis for calculating three repeated measurements, the research sample was estimated with 43 participants in group 1 and 26 participants in group 2, with an effect size of 0.25 and 0.05 α and a power of 0.99 1-β. Patients without surgery or cardiac incident in the previous 3 months, between the ages of 40 and 64 years, diagnosed with T2DM in the previous 1–10 years, and with oral antidiabetic therapy for at least 1 year were included in the study. Patients in the intervention group received 3–4 informative messages (SMS) per week in addition to conventional treatment for 6 months, whereas patients in the control group received standard care. The study was conducted at Istanbul University Medical Faculty Hospital's Diabetes Polyclinic, and prior to enrolling in the study, all participants signed the informed consent forms. The Ethics Committee of the Cerrahpaşa Medical Faculty, İstanbul University, approved the study protocol (file number 83045809/604.01/02-380913). This study was registered at ClinicalTrials.gov (#NCT04733612).

FBG, HbA1c, systolic and diastolic blood pressure, waist/hip ratio, PA as measured by the International Physical Activity Questionnaire (IPAQ)[1], and MA as measured by the Morisky Medication Adherence Scale-8 (MMAS-8)[2] were the primary outcomes, which were assessed every 3 months.

The International Business Machines Statistical Package for the Social Sciences v21.0 package program was used to analyze the data. Chi-square, Independent Groups t-test, or Mann-Whitney U Test, GLM Repeated Measures, or Friedman Repeated Measures Analysis were used to assess the differences and relationships between the variables. The P-values of <0.05 were regarded as statistically significant.

No statistically significant change was found in FBG levels in both the groups at 6 months ($P > 0.05$). In the intervention group,

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TABLE 1. Fasting Blood Glucose, Glycated Hemoglobin A, Physical Activity, Medication Adherence Scores, Blood Pressure, Heart Rate, Body Mass Index, Body Fat Ratio, And Waist/Hip Ratio of Volunteers By Groups According to Assessments

		1st Control	2nd Control	3rd Control		*P*-value
Fasting blood glucose (mmol/dl)	Intervention group	142 (115.5–164)	138 (111–169.5)	131.5 (109.2–152.2)	$\chi^2 = 2.238$	0.327
	Control group	138 (122–176)	140 (119.5–169.5)	135 (115–171.5)	$\chi^2 = 3.179$	0.204
HbA1c (%)	Intervention group	7.35 (6.4–8.5)	7.15 (6.3–7.7)	7.15 (6.6–8.1)	$\chi^2 = 6.839$	0.033
	Control group	6.8 (6.4–7.8)	6.95 (6.3–8.1)	7.05 (6.2–8.1)	$\chi^2 = 0.857$	0.651
IPAQ (MET- min/week)	Intervention group	628.5 (346.5–1188)	924 (445.5–2772)	990 (594–2079)	F = 7.960	0.019
	Control group	489 (297–1089.4)	693 (462–1187.6)	844.5 (599.2–1445.4)	F = 5.518	0.063
MMAS-8 scores	Intervention group	6.75 (5.5–8)	7 (6.75–8)	7 (6–8)	F = 8.817	0.012
	Control group	7 (5.6–8)	6.87 (5–7.8)	7 (5.6–8)	F = 2.795	0.247
Systolic blood pressure (mmHg)	Intervention group	118.8 ± 16.0	118.4 ± 15.2	117.6 ± 15.8	F = 0.134	0.853
	Control group	121.9 ± 16.95	119.4 ± 16.1	116.3 ± 17.0	F = 2.086	0.138
Diastolic blood pressure (mmHg)	Intervention group	76.7 ± 8.7	76.0 ± 10.7	74.4 ± 10.9	F = 1.299	0.278
	Control group	78.4 ± 10.5	77.0 ± 10.0	75.6 ± 9.2	F = 0.946	0.379
Heart rate	Intervention group	77 (72–82)	75 (71–80)	74 (69–79)	$\chi^2 = 2.81$	0.245
	Control group	71 (66.5–85.5)	72 (69.5–76)	72 (71–78)	$\chi^2 = 1.021$	0.600
BMI (kg/m^2)	Intervention group	29.4 (27–32.4)	29.3 (25.8–32.4)	29.4 (26.1–31.8)	$\chi^2 = 1.853$	0.396
	Control group	28.7 (26.5–34.9)	28.2 (26.2–34.9)	28.4 (26.5–35.0)	$\chi^2 = 2.383$	0.304
Body fat ratio	Intervention group	30.8 ± 9.7	31.7 ± 8.6	30.3 ± 9.3	F = 1.716	0.188
	Control group	28.6 ± 10.3	30.8 ± 10.2	37.5 ± 32.7	F = 1.041	0.363
Waist/hip ratio	Intervention group	0.96 ± 0.08	0.95 ± 0.08	0.96 ± 0.09	F = 0.258	0.773
	Control group	0.94 ± 0.07	0.94 ± 0.07	0.95 ± 0.05	F = 0.702	0.499

HbA1c, glycated hemoglobin A; IPAQ, International physical activity questionnaire; MMAS-8, Morisky Medication Adherence Scale; BMI, body mass index (kg/m^2)

a statistically significant improvement was found in HbA1c percentages and PA levels ($P < 0.05$). A statistically significant increase in drug adherence (MMAS-8 score) was found throughout the 6-month intervention group ($P < 0.05$) using Friedman's Repeated Measures chi-square test. After 6 months, no statistically significant difference was found in the systolic and diastolic blood pressures, heart rate, body mass index, waist/hip ratio, and body fat ratio in both the groups ($P > 0.05$) (Table 1). Our findings on FBG, HbA1c, and MMAS-8 scores were consistent with those reported in previous studies by Sezgin et al.[3], Islam et al., and Abbas et al.[5]

In conclusion, our results demonstrated that SMS notifications improved metabolic control, PA, and MA in middle-aged Turkish patients with T2DM. SMS notifications are a useful and effective tool for managing and monitoring chronic diseases, such as T2DM, which necessitate lifestyle changes.

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Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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