Impact of social distancing due to COVID-19 on the changes in HbA1c in patients with type 2 diabetes

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Background/Aims: The spread of COVID-19 worldwide has resulted in changes in lifestyle in areas affected by COVID-19. Following the detection of a super-spreader on February 19, 2020, the number of patients with COVID-19 rapidly increased in Daegu. As a consequence, the citizens of Daegu conducted a voluntary lock-down for 2 months, and involved strict social distancing. We sought to determine the effects of social distancing because of COVID-19 on the changes in HbA1c level in patients with type 2 diabetes.

Methods: We retrospectively analysed the changes in glycated hemoglobin levels in patients with type 2 diabetes who undertook social distancing because of COVID-19. We compared the △HbA1c between COVID-19 and non-COVID-19 cohorts that were enrolled at the same time of year. A total of 5,069 patients were enrolled. The age, sex, and HbA1c values for each patient were collected from their electronic medical records.

Results: The mean HbA1c levels of the non-COVID-19 cohorts were decreased in Period 2 than in Period 1, whereas the mean HbA1c level of the COVID-19 cohort did not differ between the two periods. The mean ⊿HbA1c of the COVID-19 cohort was significantly higher than those of the non-COVID-19 cohorts (Table 1 and Figure 2). The △HbA1c of participants of <50 years and with HbA1c <7.0% (53 mmol/mol) in the COVID-19 cohort showed larger changes than other subgroups. Subgroup analysis showed that social distancing significantly increased the mean HbA1c level of participants of <50 years, and in patients with low baseline HbA1c levels.

Conclusions: Social distancing negatively impacts blood glucose control in patients with type 2 diabetes, especially those who are younger and have good blood glucose control. These data suggest that the deleterious effects of social distancing are more marked in patients who undertake higher levels of physical and social activities. Therefore, it is important that management strategies are modified for patients with type 2 diabetes during periods of social distancing that are designed to minimize COVID-19 infection.

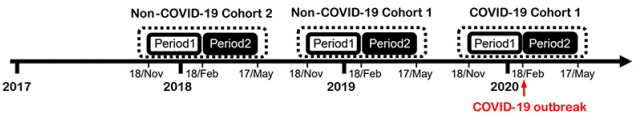

Figure 1. The flow chart of the study design

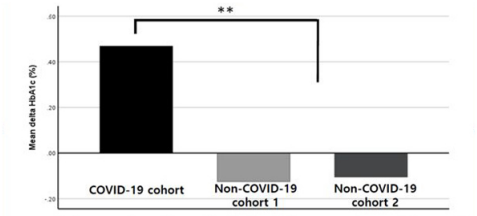

Figure 2. The changes in glycated hemoglobin (ΔHbA1c) of patients with type 2 diabetes in the COVID-19 cohort and non-COVID-19 cohorts
ΔHbA1c was presented as mean ± standard error. Data were analyzed using analysis of covariance. ** p <0.01

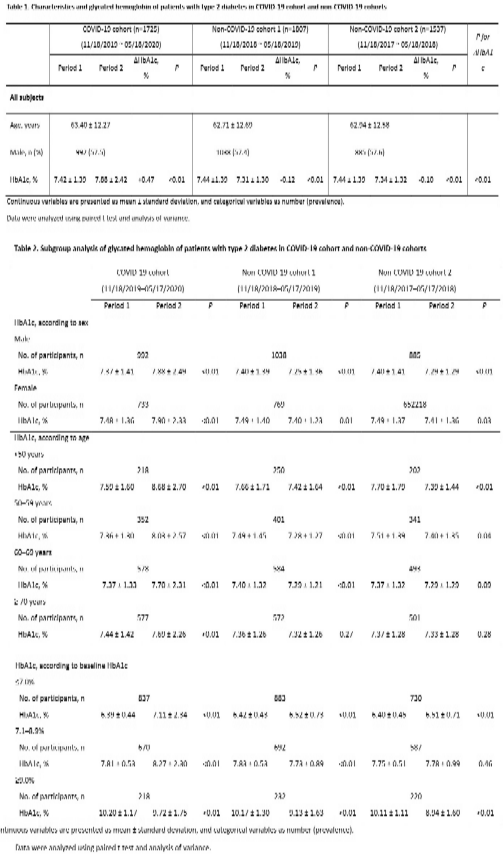

Table 1. Characteristics and glycated hemoglobin of patients with type 2 diabetes in COVID-19 cohort and non-COVID-19 cohorts

	COVID-19 cohort (n=1725) (11/18/2019 ~ 05/18/2020)				Non-COVID-19 cohort 1 (n=1807) (11/18/2018 ~ 05/18/2019)				Non-COVID-19 cohort 2 (n=1537) (11/18/2017 ~ 05/18/2018)				P for ΔHbA1c
	Period 1	Period 2	ΔHbA1c, %	P	Period 1	Period 2	ΔHbA1c, %	P	Period 1	Period 2	ΔHbA1c, %	P	
All subjects													
Age, years	63.40 ± 12.27				62.71 ± 12.69				62.94 ± 12.58				
Male, n (%)	940 (57.5)				1068 (57.9)				885 (57.9)				
HbA1c, %	7.42 ± 1.30	7.88 ± 2.42	+0.47	<0.01	7.44 ± 1.30	7.31 ± 1.30	-0.12	<0.01	7.44 ± 1.30	7.34 ± 1.32	-0.10	<0.01	<0.01

Continuous variables are presented as mean ± standard deviation, and categorical variables as number (prevalence).
Data were analyzed using paired t test and analysis of variance.

Table 2. Subgroup analysis of glycated hemoglobin of patients with type 2 diabetes in COVID-19 cohort and non-COVID-19 cohorts

	COVID-19 cohort (11/18/2019~05/17/2020)			Non-COVID-19 cohort 1 (11/18/2018~05/17/2019)			Non-COVID-19 cohort 2 (11/18/2017~05/17/2018)		
	Period 1	Period 2	P	Period 1	Period 2	P	Period 1	Period 2	P
HbA1c, according to sex									
Male									
No. of participants, n	940			1068			885		
HbA1c, %	7.42 ± 1.41	7.88 ± 2.49	<0.01	7.40 ± 1.39	7.29 ± 1.36	<0.01	7.40 ± 1.41	7.29 ± 1.39	<0.01
Female									
No. of participants, n	733			739			652	638	
HbA1c, %	7.48 ± 1.36	7.90 ± 2.33	<0.01	7.49 ± 1.40	7.40 ± 1.33	0.01	7.48 ± 1.37	7.41 ± 1.36	0.03
HbA1c, according to age									
<50 years									
No. of participants, n	318			350			302		
HbA1c, %	7.50 ± 1.60	8.68 ± 2.70	<0.01	7.66 ± 1.71	7.42 ± 1.64	<0.01	7.70 ± 1.70	7.39 ± 1.44	<0.01
50–59 years									
No. of participants, n	352			401			341		
HbA1c, %	7.46 ± 1.40	8.04 ± 2.57	<0.01	7.49 ± 1.45	7.28 ± 1.27	<0.01	7.51 ± 1.48	7.40 ± 1.45	0.08
60–69 years									
No. of participants, n	578			584			498		
HbA1c, %	7.37 ± 1.33	7.70 ± 2.51	<0.01	7.40 ± 1.32	7.30 ± 1.21	<0.01	7.37 ± 1.32	7.29 ± 1.29	0.03
≥ 70 years									
No. of participants, n	577			572			501		
HbA1c, %	7.44 ± 1.42	7.69 ± 2.26	<0.01	7.36 ± 1.26	7.32 ± 1.26	0.27	7.33 ± 1.28	7.33 ± 1.28	0.28
HbA1c, according to baseline HbA1c									
<7.0%									
No. of participants, n	837			883			730		
HbA1c, %	6.59 ± 0.44	7.11 ± 2.54	<0.01	6.47 ± 0.46	6.52 ± 0.75	<0.01	6.40 ± 0.45	6.51 ± 0.71	<0.01
7.1–8.5%									
No. of participants, n	670			692			587		
HbA1c, %	7.81 ± 0.53	8.27 ± 2.30	<0.01	7.83 ± 0.53	7.73 ± 0.89	<0.01	7.75 ± 0.51	7.78 ± 0.99	0.46
≥8.0%									
No. of participants, n	218			332			220		
HbA1c, %	10.20 ± 1.17	9.72 ± 1.76	<0.01	10.13 ± 1.30	9.13 ± 1.63	<0.01	10.11 ± 1.11	8.94 ± 1.60	<0.01

Continuous variables are presented as mean ± standard deviation, and categorical variables as number (prevalence).
Data were analyzed using paired t test and analysis of variance.