Lockdown: Pandemic Covid-19 and After What About Glycemic Control Status of Diabetes Mellitus Type II Patients Before and after Lockdown? The Way Ahead

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ABSTRACT

Introduction: Covid 19 pandemic and the lockdown to contain the virus spread has thrown the world into unexpected health emergency with disruption of essential health services. The glycemic control of diabetic patients was affected because of the unavailability of drugs and lack of physician consultation.

Objective: The study was carried out to evaluate the glycemic control in diabetic patients after the lockdown and its comparison with pre lockdown levels.

Methods: When patients with type II diabetes mellitus start following after unlocking, will be enrolled in the study. All patients with type II diabetes mellitus follow in the clinic will be enrolled with the simple random method. More than 150 subjects will be enrolled and data collected over 2.5 months. The statistical analysis will be done by unpaired t-test and chi-square test analyzed by SPSS 19 version of the software.

Results: There was a considerable increase in the interquartile range of blood sugar levels with 144.75- 207.50 and 162.0-198.50 before and after lockdown ($p < 0.05$). The increase in median postprandial sugar levels was more pronounced in males than in females. A significant increase in blood sugar levels was noted in patients who were not on medication, with blood sugars almost double compared with the pre lockdown period. The median sugar levels increased from 181mg/dl to 225 mg /dl in patients who were not able to exercise during the period of lockdown and the difference was found to be significant (P -value < 0.05).

Conclusion: Our study showed that postprandial blood sugar levels were deranged during the 45 days lockdown. Some factors like lack of exercise, non-availability of medications during the lockdown led to deranged glycemic levels and in turn increase in medication in the post lockdown period is worrisome.

Key Words: Lockdown, Blood Sugar Levels, Pandemic Covid-19, Diabetes Mellitus Type II, Glycemic Control

INTRODUCTION

The COVID-19 outbreak declared as a health emergency in January 2020 has thrown most countries into unprecedented massive health and humanitarian crisis that humanity has not faced in modern times. In response to such a crisis, the lockdown was one of the common strategies that many countries have adopted to control the further outbreak of Covid-19. India too adopted a nationwide lockdown strategy which has led to an unprecedented health care crisis with all the health care establishments affected and disruption of care and follows up of major Noncommunicable diseases like diabetes mellitus.^{1,2} In the pursuit to control pandemic some strategies like lockdown, practicing social distancing and encouraging

regular hand washing were implemented. Sudden lockdown and its extension fearing the increase in Covid 19 cases has resulted in changes in dietary pattern, physical activity and psychological health, which inadvertently hurt glucose levels in diabetic patients. One goal and perspective of lockdown is to contain the spread of the virus, simultaneously on the other hand it can impact the very health system as well as transport. This can hamper the availability of anti-hyperglycemic drugs and difficulty in obtaining of physician's consultation. Because of the unavailability of transport, there was a shortage of essential drugs, insulin and laboratory facilities for testing blood sugar levels. Altogether all these factors along with increased stress levels have led to the deterioration of preexisting chronic diseases.³

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Previous studies show disasters had a substantial impact on glycemic parameters^{4,6} and also increased complications because of improper maintenance of blood sugar levels and elevation of HbA1c levels.^{7,8} A survey carried out in 155 countries by WHO to know the effect of lockdown on the restriction of health care services for patients with Diabetes and other Noncommunicable diseases reported, in 49% of the countries diabetes treatment has been affected partially or completely and the effect is more pronounced in middle-income countries.⁹ With India being the diabetic capital of the world with 42 million cases of diabetes and at the same time with the double burden of Covid 19 cases of about 3 million cases had implemented one of the most stringent lockdowns. This has increased the risk and vulnerability of diabetic patients with poorly controlled sugar levels to SARS-CoV2 and increased risk of morbidity and mortality due to macrovascular and microvascular complications.^{10,11} COVID-19 and diabetes mellitus has the two-way interaction which sets up a vicious cycle wherein COVID-19 leads to worsening of dysglycemia and diabetes mellitus, which exacerbates the severity of COVID-19. Thus, it is vitally important that people with diabetes mellitus take all necessary measures and ensure good glycemic control during this ongoing pandemic.¹² With covid cases going uphill in the unlock phase there is a felt need to evaluate the effect of lockdown on diabetic patients' blood sugar levels before and after lockdown.

MATERIALS AND METHODS

This cross-sectional study was conducted from 01/06/2020 to 15/08/2020 in the Diabetic clinic of a tertiary care hospital in Karad, Maharashtra. This diabetic clinic is a referral hospital with the specialised and exclusive treatment of Diabetes and its related complications. The sample size was calculated by PASS 2008, a statistical tool for sample size calculation. With 90% power to detect a difference of -0.1 between the null hypothesis and standard deviation (alpha) of 0.05 using a two-sided paired sample t-test, the sample size calculated was 150. The study started in June after the lockdown was lifted and patients started coming for routine follow up. All the consecutive patients with diagnosed type 2 diabetes were examined till 150 participants were included in the study. Demographic details, postprandial blood sugar levels at the time of the visit and detailed history with regards to medication, exercise and stress were recorded. With the help of a system database, previous records of the same patients, especially postprandial blood sugar levels before lockdown (February and March) were sought. The patient's previous history of exercise and stress were enquired and noted down. Prior consent from the study subjects and ethical approval from the Ethical committee of the Diabetaplust centre was obtained before patients were enrolled in the study.

Statistical analysis

Data entry and analysis was done in SPSS 21. Mean, standard deviation and appropriate statistical test like Paired t-test was applied to know the significance of the difference in means between the groups.

RESULTS

A total of 150 types 2 diabetes patients were enrolled in the study, with 68 (45.3%) and 82 (54.7%) males and females respectively. The mean age of the patients was 58.73 ± 10.47 years with the range from 28 – 82 years (Table 1 and 2).

Table 1: Sex distribution of the patients

Sex	Frequency	Percent
Female	68	45.3
Male	82	54.7
Total	150	100.0

Figure 1: Sex distribution of the patients.

Table 2: Age distribution of the patients

Sex	N	Mean	Std. Deviation	Minimum	Maximum
Female	68	58.54	9.98	32	81
Male	82	58.89	10.91	28	82
Total	150	58.73	10.47	28	82

Table 3 depicts the change in the median blood sugar levels of patients before and after lockdown. There was a considerable increase in the interquartile range of blood sugar levels with 144.75- 207.50 and 162.0- 198.50 before and after lockdown (p value<0.05). The increase in median postprandial sugar levels was more pronounced in males than in females.

Table 3: Comparison of Post Prandial Sugar Before and After COVID19

Sex	PP sugar	N	Median	Interquartile Range	Z-value	P-value
Female	Before	68	174.50	(141.50-214.75)	-2.34	0.019
	After	68	188.00	(170.00-233.50)		
Male	Before	82	167.00	(145.75-203.75)	-3.673	<0.001
	After	82	200.50	(156.75-254.00)		
Total	Before	150	167.50	(144.75-207.50)	-4.289	<0.001
	After	150	198.50	(162.00-236.25)		

* Statistically significant if P <0.05

Figure 2: Comparison of Post Prandial Sugar Before and After COVID19.

A significant increase in blood sugar levels was noted in patients who were not on medication, with blood sugars almost double compared with the pre lockdown period. The median sugar levels increased from 181mg/dl to 225 mg /dl in patients who were not able to exercise during the period of lockdown and the difference was found to be significant (P-value <0.05). Patients with no stress or depression as well as patients with stress or depression noted an increase in median blood sugar levels (P<0.05) (Table 4).

Table 4: Comparison of Post Prandial Sugar with various factors Before and After COVID-19

Factors	PP sugar	N	Median	Interquartile Range	Z-value	P-value
No Medication	Before	5	155.00	(128.50-203.00)	-2.023	0.043
	After	5	313.00	(280.00-359.00)		
Medication	Before	145	169.00	(144.50-208.00)	-3.82	<0.001
	After	145	197.00	(158.50-233.50)		
Not able to exercise	Before	58	181.00	(145.00-208.25)	-5.689	<0.001
	After	58	225.00	(194.50-274.00)		
Able to exercise	Before	92	165.50	(143.25-208.25)	-0.773	0.439
	After	92	179.00	(149.25-217.00)		
No Stress/Depression	Before	145	167.00	(144.00-206.50)	-4.142	<0.001
	After	145	197.00	(158.50-236.50)		
Stress/Depression	Before	5	196.00	(190.50-237.50)	-1.214	0.225
	After	5	225.00	(212.00-279.00)		
No Increase of Medication	Before	79	180.00	(150.00-216.00)	-2.607	0.009
	After	79	168.00	(146.00-197.00)		
Increase of Medication	Before	71	161.00	(136.00-202.00)	-7.078	<0.001
	After	71	233.00	(201.00-277.00)		

* Statistically significant if P <0.05

Figure 3: Comparison of Post Prandial Sugar with various factors Before and After COVID19.

DISCUSSION

While the entire world is struggling to contain the virus spread, it's very much pertinent to manage comorbidities that can significantly expose the individual to the SARS-CoV2 virus and also increase the mortality of Covid patients with hyperglycemia.² Diabetic patients were double burdened because of Diabetes Distress,⁶ to meet the demands of diabetes with little support from family members as well as to stay protected from SARS CoV2 infection.¹³ This in turn alters the hormonal homeostasis resulting in hyperglycemia with a more pronounced effect on fasting blood sugar levels than postprandial.¹⁴

The respondents who came to the hospital after post lockdown were aged between 28-82 years and their mean age was 58.73 years. Data retrieved from the system database with particular emphasis on postprandial blood sugar levels showed a considerable increase in blood sugar levels post lockdown. These findings were supported by a similar observational study done in central India to know the effect of lockdown due to Covid 19 on glycemic control in diabetic patients aged 18-65 with a mean age of 54.68 years. There was a significant increase in postprandial blood sugar levels (157.7 ± 18.23) in lockdown compared to pre lockdown period (124.9 ± 10.49). The possible reason for it may be the change in amount and type of diet due to being at home with lack of exercise due to lock down which majorly affects the PPBG.¹⁵

The study noted the increase in the range of blood sugar levels before and after lockdown from 144.75-207.50 mg /dl to 162.00-236.25mg/dl respectively. This upset in the blood sugar levels is corroborated by a study has done post lockdown among 52 consecutive types 1 diabetic patient visiting tertiary care hospital in India reported worsening of hyperglycemia, with average blood sugar levels of 276.9 ± 64.7

mg/dl as compared to 212.3 ± 57.9 mg/dl during pre lockdown phase. With lockdown in effect for more than 45 days resulted in the increase of mean HbA1c to $10 \pm 1.5\%$ from pre lockdown levels of $8.8 \pm 1.3\%$.¹⁶

As were at admist of the pandemic, literature available with regards to lockdown affecting is scarce, studies carried out during similar natural calamities like Hurricane Katrina gives an insight into the present situation. A study done by Fonseca et al 2008, in three health care systems in the US reported 6 months post-disaster mean HbA1C levels of 7.7% vs 7.3% HbA1C before the disaster.⁸ Stress during the time of disasters is known to have an impact on blood sugar levels such as the study done in Japan,¹⁷ after earthquake resulting in psychological stress due to property damage, injuries, and mortality among relatives. Reports of poor glycemic control for up to 1 year were noted. On the contrary, our study didn't notice stress, as such having an adverse impact on blood sugar levels. Whereas non-availability of diabetic medications during lockdown has resulted in an increase in blood sugar levels from median sugar levels of 161 mg /dl before lockdown to 233mg/dl of medial sugar levels after lockdown. Overall, there is derangement on glycemic control because of stress, lack of exercise and non-availability of medications which is corroborated by Ghosal et al 2020 also concluded that the duration of lockdown had a direct impact on glycemic control and diabetes-related complications.¹⁸

Limitation of the study: As the consecutive patients coming to the hospital after lockdown were selected and were asked for some of the contributing factors for hyperglycemia, different kinds of bias like sampling bias and recall bias might have occurred. A small sample size from the single centre is also hindering factor for the exploration of results on a larger population.

CONCLUSION

Our study showed that postprandial blood sugar levels were deranged during the 45 days lockdown. Some factors like lack of exercise, non-availability of medications during the lockdown led to deranged glycemic levels and in turn increase in medication in the post lockdown period is worrisome. Keeping in view, previous disasters worsening the management of Noncommunicable diseases, prompt patient-centric multidisciplinary approach and preparedness is the need of the hour.

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