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Original Research Article

Impact of COVID-19 pandemic on diabetes: a cross-sectional study at urban health centre in Goa

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ABSTRACT

Background: Diabetes is an important comorbidity which is contributing to the mortality among COVID-19 patients. There are limited studies in Goa which have measured the impact of COVID-19 on the diabetes. Therefore, this study is undertaken to measure the impact of lockdown on glycaemic control in patients with T2DM. The study objectives were to assess the changes in HbA1c and to identify some factors affecting the glycaemic control during the pandemic on the urban population of Goa during the period of pandemic.
Methods: A cross-sectional comparative study was undertaken during August to September 2020 amongst Diabetic patients undergoing treatment at Santa Cruz (Goa). Data was collected via oral questionnaire and from patients records at 6 months before and after lockdown after IEC approval. The data was entered into excel v2010, and analysed using SPSS v22 and expressed as simple proportion and percentages.
Results: Out of total 50 patients enrolled in the study, the mean post-lockdown HbA1c (8.2±2.1) was found to be higher as compared to pre-lockdown values (7.3±1.3) and the difference was statistically significant ($p<0.05$). The Chi Square test was calculated comparing HbA1c after lockdown with Diet, exercise and drug compliance which was found to be statistically significant ($p<0.05$).
Conclusions: Mean HbA1c of 50 T2DM patients was higher post lockdown. There is a need to re enforce necessary lifestyle modification and prescribed drug compliance for adequate diabetes control during COVID-19 pandemic to reduce overall morbidity.

Keywords: Diabetes mellitus, COVID-19, Pandemic, Effect, Community

INTRODUCTION

We are amidst an ongoing pandemic caused by SARS-CoV-2. In early December 2019, the first pneumonia cases of an unknown origin were identified in China.[1] The pathogen has been identified as a novel enveloped RNA beta-coronavirus which had symptoms like fever, dry cough, dyspnoea, fatigue, and lymphopenia. are identified as the symptoms of patients with COVID-19.[2] Severe pneumonia quickly became a newly recognized illness that was spreading rapidly throughout Wuhan (Hubei province) to other provinces in China, and continues to spread from place to place around the world.[3] The world health organization (WHO) pronounced the official name of SARS-CoV-2-induced disease as the COVID-19. According to ministry of health and family welfare (MoHFW) by October 2021 there were 3.38 crore cases with 4.49 lakh deaths. Due to novelty of disease, aspects affecting severity of status and death remain unknown.[4] According to American diabetes association patients with diabetes are at more risk of developing severe complications.[5,6,8]

Also, as we know (DM is a disease and an international health hazard, the severity of which has increased in the last twenty years. In India alone there are 770,05,600 cases of diabetes in adults with a prevalence of 8.9% according to IDF (International diabetes federation).[7]

According to the latest global estimate from the international diabetes federation that number of affected patients in 2019 stands at 463 million. It is projected that by 2045, around 700 million people will suffer from diabetes. Diabetes is the top cause of end-stage renal disease, adult-onset blindness, and non-traumatic lower extremity amputations. Diabetic problems cause more disability, and at the extreme, life-threatening disorders.[8]

In an effort to stem the spread of the virus from individuals travelling into India from endemic areas to internal community spread, a feature of the stage 3 of the disease process, a temporary 21 days lockdown (complete restriction on all international and domestic travel, social isolation, and suspension of all non-essential services) as announced by Prime minister of India on 24th March 2020. On one hand this could be a vital step in stemming the spread of the virus, however, on the other there are likely to be issues related to the impact of this lockdown on patients with diabetes; the worsening of hyperglycaemia an increase in diabetes-related complications. This could be due to the limitation of free space to exercise, limited resources to implement a healthy lifestyle, restrictions on the availability of anti-hyperglycaemic agents and difficulty in obtaining of physician's guidance.[9-11] Further, because of limitations of transport of goods and movement of patients, there is likely to be shortage of drugs, insulin, and glucose testing strips and glucose meters. All these factors have the potential to increase the stress level and its associated impact on the pre-existing disease.[12]

The study objectives were to assess the changes in HbA1c and to identify some factors affecting the glycaemic control during the pandemic on the urban population of Goa during the period of pandemic. Since there was limited data on this particular topic, this study was undertaken to measure the impact of lockdown on glycaemic control in patients with T2DM.

METHODS

A cross-sectional comparative study was undertaken during August to September 2020 amongst diabetic patients undergoing treatment at Urban health and training centre (UHTC)-Santa Cruz Goa which is a field practice area under department of community medicine, Goa medical college. IEC approval was taken from the institutional ethics committee. A Convenience sample comprising of 50 participants was taken. All diabetic patients who were on regular treatment at UHTC Stcruz even prior to the lockdown were included in this study. An oral questionnaire was used to collect the data after informed consent from the study participants. Similarly, the blood investigations were taken from the UHTC Stcruz laboratory records both 6 months before and after the lockdown of the concerned study participants.

The laboratory data which was taken consisted of venous blood values such as fasting sugar value, postprandial sugar value, HbA1c, lipid profile and renal function test.

The data was entered into excel v2010 and statistically analyzed using statistical package for the social sciences (SPSS) v22 and R-programme.

RESULTS

Out of the total (50) study participants, majority 26 (52%) were males and 24 (48%) were females. Age of the study population ranged from 40-80 years, with a mean age 56 years with a majority (38%) belonged to 60-69 years age group.

Table 1 shows the blood parameters before and after the lockdown which shows that out of all the blood parameters tested mean HbA1c, mean FBSL, mean PPBSL and mean high density lipoprotein levels showed statistically significant difference.

Table 1: The blood parameter levels before and after nationwide lockdown.

Blood parameters	Before lockdown (A)	After lockdown (B)	Mean difference (D=A-B)	95% confidence interval
Mean HbA1c	7.3±1.3	8.2±2.1	-0.87	-1.28 to -0.46*
Mean FBSL	119±29.1	134±51.9	-14.85	-27.72 to -1.96*
Mean PPBSL	213±58.6	229±9.9	-15.6	-30.70 to -0.49*
Mean blood urea	24.3±7.2	24.9±6.3	-0.6	-2.36 to-1.15
Mean serum creatinine	1.4±3.8	0.85±0.24	0.5	-0.54 to 1.64
Mean total cholesterol	167±45.1	169±40.9	-1.6	-12.60 to 9.24
Mean triglycerides	135.8±46.9	132±48.0	3.6	-6.53 to 13.7364
Mean high density lipoprotein	50±10.4	46.2±10.0	3.7	0.77 to 6.74*
Mean low-density lipoprotein	103.7±36.6	99.5±34.6	4.2	-3.81 to 12.29
Mean very low-density lipoprotein	28.6±15.6	27.1±10.1	1.5	-1.74 to 4.78

* Indicates statistically significant difference

Table 2: Univariate and multivariate analysis of predictors.

Variables	Univariate analysis (Beta)	P value	Multivariate analysis	P value
Age (Years)	0.003022	0.926	0.003414	0.91479
Gender-M	0.8609	0.163	1.195881	0.05479
SES	0.3847	0.512	-0.159155	0.77759
Drug compliance	2.4562	0.00501***	2.527418	0.0370**
Diet affected	2.1174	0.000521 ***	2.230795	0.00112 **
Physical activity	2.3455	0.000267***	2.061348	0.00120**
Socio economic status	0.3847	0.512	-0.159155	0.77759

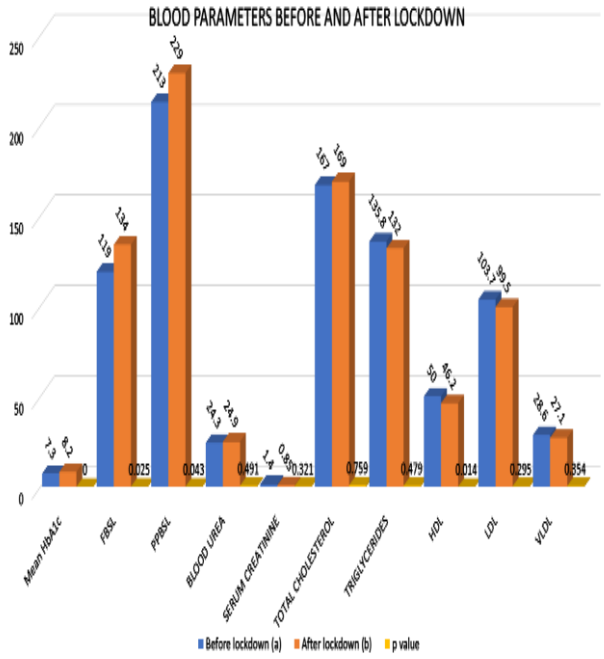

Figure 1: Blood parameters with the p value before and after lockdown.

Similarly Figure 1 shows the blood parameter with p value which shows that mean HbA1c (p=0.00), mean FBSL (p=0.025), mean PPBSL (p=0.043) and mean high density lipoprotein levels (p=0.014) were statistically significant (considering p≤0.05 as statistically significant).

Table 2 shows the results of Univariate and multivariate analysis of predictors interpreted using R programme. It shows that drug compliance, diet affected and physical activity were statistically significant and had a direct relation to HbA1c levels taking HbA1c as the dependent variable.

According to BG prasad classification most of the study participants belonged to upper class (76%) followed by upper middle class (20%) and rest belonged to middle class (4%).[13] When questions were asked about the ongoing pandemic all the study participants (100%) had knowledge about the ongoing pandemic and the measures to prevent spread of the disease.

Only 90% of the study participants knew all the symptoms of COVID-19 when they were enumerated. 39 out of 50 participants knew that it was spread via droplet and contaminated surfaces, whereas some believed it was spread via contaminated food and water, and others believed it was vector borne.

Out of the 50 diabetic patients under study, 64% had associated hypertension and dyslipidemia, 6% had hypertension and dyslipidemia with heart disease, 2% had hypertension and kidney disease, 18% of the diabetics had hypertension alone and 10% of the diabetics had dyslipidemia alone.

Looking at the mode of treatment most of the study participants were on oral hypoglycemic agents (OHAs) (68%), 26% were on OHAs and insulin and the remaining 3% were on OHAs with alternative medications from Ayurveda and homeopathy.

Only 8% of the study participants used a glucometer for home monitoring of blood glucose.

Over 90% of the study participants relied completely on the government pharmacy for drugs.

The 82% said that their drug compliance worsened during lockdown, and almost all of them stated the reason to be financial problems therefore could not purchase the medications. When asked about food habits around 84% said that their food habits worsened during lockdown with most study participants said decreased intake of fruits and vegetables and increased intake of carbohydrates.

Around 84% said that their physical activity decreased during lockdown and only sixteen percentages said that their yoga and physical activity increased during lockdown.

Regarding addictions when the study participants were asked if their addictions worsen during lockdown, thirteen out of fifty participants who had any form of addictions prior to lockdown said that their addictions did not worsen after lockdown eighty-four percentages (84%).

DISCUSSION

COVID-19 is an on-going pandemic around the globe. Though there were not many studies of diabetes control during COVID 19 lockdown, certain studies done during lockdown periods of natural disasters like hurricanes and landslide were taken into account which closely simulates lockdown in so far as resource limitations and challenges are concerned. Out of the 50 study participants at UHTC Stcruz, majority 26 (52%) were males with a mean age 56 years, with a majority (38%) belonging to 60-69 years age group.

There was a considerable increase in HbA1c seen post lockdown. The mean difference in HbA1c was -0.87 which was similar to a study done by Fonseca et al wherein the mean HbA1c was had increased significantly to 8.3%.[14] Similarly a significant increase in the mean value of HbA1c level was found after the earthquake in a study done by Kirizuka et al.[15] Similarly there was a mean increase in FBSL (p=0.025) and increase in mean PPBSL (p=0.043) which is depicted by the increase in mean HbA1c.

In contrast to the study done by Fonseca et al which showed increase in mean LDL, Triglyceride levels and HDL levels the above study showed a decrease in mean HDL levels (mean difference=3.7) with no change in mean LDL, mean VLDL or mean serum cholesterol or triglycerides level post lockdown.[14]

When compared to a study done by Ghosh et al which showed similar results wherein the diet was affected during lock down which consisted of increase in consumption of fats and carbohydrates and decreased intake of fruits and vegetables.[16] Similar study findings were seen according to a study conducted by Ruiz-Roso et al.[17] This could be due to reduced availability of fresh vegetables and fruits due to COVID-19 restrictions and restriction on interstate transpiration of fresh vegetables and fruits.

Similarly there was a decrease in physical activity seen in the study participants (84%) and surprisingly 16% of the study participants showed an increase in physical activity and yoga which were similar to the findings of study done by Ghosh et al.[16] Whereas a study by Prasanth Sankar et al showed contradictory findings with overall physical activity and dietary adherence which remained unchanged in more than 80% of the participants.[18] The reason for decreased excessive would be due to lockdown and limitation of movement outside their home due to COVID-19 restrictions and the slight increased could be due to alternatives like increase engagement in routine activities at home and yoga and other relaxation activities.

Similarly, the same study by Ghosh et al showed that the addictions decreased post lockdown similar to the above study findings probably due to decrease availability of tobacco or alcohol.[16]

Limitations

As study conducted in a urban population results may not correlate with entire states' prevalence pattern and sociodemographic distribution.

CONCLUSION

During the current pandemic there have been many lifestyle changes noted in our participants. Few of these like taking care of diet and exercise, adding more fruits, having home cooked meals, regular supply of anti-hyperglycaemic agents and willingness for teleconsultation could help patients with diabetes maintain good glycaemic control. However increased carbohydrate consumption, snacking, physical inactivity, decreased duration of physical activity, reduced SMBG and increase in mental stress are challenging issues and may exacerbate glycemia.

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