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General Medicine

GLYCEMIC STATUS IN COVID AND POST COVID-19 INFECTION IN HOSPITALISED PATIENTS.

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ABSTRACT **Background:** Coronavirus disease 2019 (COVID-19) caused by coronavirus 2 (SARS CoV-2) has a wide spectrum of clinical picture which consist asymptomatic infection to severe respiratory symptoms. The hyperglycemia that occurs in the acute inflammatory state of COVID-19 patients is found to be more pronounced amongst diabetes, prediabetes, and/or with obesity. Present study is undertaken with the objectives to analyse Glycemic Status and dysglycemic grounds in COVID-19 hospitalized patients. **Material & Methods:** This Cross sectional Observational study was conducted in Department of Medicine, MGM Medical College and Hospital, Aurangabad [Maharashtra], India. 75 RT-PCR confirmed Covid-19 patients for dysglycemic status were enrolled. **Observations & Results:** The mean age of patients in the study was 55.04±16.83 years. The male had (60.0%) predominance than female (40.0%). All the patients were given steroids during treatment at hospitalisation, 72(96.0%) patients were provided Remdesivir, 66(88.0%) were treated with anticoagulants and 25(33.3%) of patients were given fabiflu. The mean HbA1C level at ICU admission was 7.16±0.84, while the mean HbA1C level 3 months post hospitalization irrespective of discharge date was 7.96±1.30. This observation was statistically significant. **Conclusion:** Present study confirmed that the blood glucose levels significantly found increased not only during covid-19 hospitalization but also after laps of 3 months of COVID infection. Also noted significantly higher values of HBA1c at three months post infections on discharge.

KEYWORDS : COVID-19, HbA1C level, Dysglycemia.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) caused by coronavirus 2 (SARS CoV-2) has a wide spectrum of clinical picture which varied from asymptomatic infection to severe respiratory symptoms. Many studies suggest that individuals with comorbidities such as diabetes are more likely to have COVID-19 and its complications [1,2,3].

As a general mechanism it is known that infection leads to profound alterations in whole-body metabolism, including glucose, fat, and protein. Effect of severity of COVID-19 infection on glycemic parameters including blood glucose and glycated haemoglobin (HbA1c) is described and yet scenario remains unclear. A Previous study detected Corona Virus damaging pancreas indicating that it could cause acute insulin dependent diabetes mellitus [4].

Link between chronic inflammation and hyperglycemia is an established fact. The hyperglycemia that occurs in the acute inflammatory state of COVID-19 patients is found to be more pronounced in diabetes, prediabetes, and/or in obese. Inflammatory changes in the immune system like alterations in specific cytokines, chemokines, activation state of various leukocyte populations, increased apoptosis and tissue fibrosis are observed in obesity and type 2 diabetes [5,6,]

This established inflammatory state acts as mise-en-scene for further elevations of the levels of inflammatory cytokines in COVID-19 that may lead to insulin resistance.

Evidences suggest that better glycemic control is often closely associated with better clinical improvement and COVID-19 outcomes [7].

Hyperglycemia status has been observed fluctuating during pandemic COVID-19. Certain observations have revealed that pre-diabetic patients marched towards diabetic status and those diabetic has shown worsening in their status. Diabetic dysglycemic candidates further seen detoriation in their macrovascular / microvascular / metabolic conditions. Myriad reasons for dysglycemia are observed with the patients and their relatives. The reasons offered were either preventable or non-preventable during the pandemic. The stress situation of the disease before, during and post hospitalization besides receiving heavy doses of steroids and Glycosuric antibiotics and other agents are main factors resulting in this dysglycaemic status. More cited reasons described by patients / patients relatives were improper diet, non-availability of drugs / insulin / poor physical exercise / poor activity / no work, no money, no drugs are some of the reasons worthy of note.

A prospective study is undertaken to know glycemic status before, during and after COVID-19 in patients admitted in MGM Medical College and hospital Aurangabad with objectives to analyse and record possible reasons for dysglycemia in patients with COVID-19.

MATERIAL AND METHODS

Study Design: Prospective Cross sectional Observational study.
Sample Size- 75 Covid-19 hospitalized patients.
Ethical Approval- Institutional ethical approval obtained.

Inclusion Criteria:

- COVID 19 positive patients by RTPCR who were dysglycemic at the time of admission, and/or pre-diabetic or over-diabetic.
- Cases of covid 19 who were having euglycemic status on admission however developed dysglycemia during ongoing hospitalization.
- Known and well controlled diabetic patients either on Oral hypoglycemic agents or Insulin are also included.

Exclusion Criteria:

- COVID-19 patients who denies history of Diabetes / pre-diabetics and found with normal glycemic status on admission and during hospitalization.

METHODOLOGY:

A prospective cross sectional observational study was conducted in MGM medical college hospital Aurangabad. All consecutive patients

of COVID-19 diagnosed with RT-PCR/HRCT review with dysglycemic status were enrolled. Pre-diabetic/diabetic/controlled diabetic were included for the study.

Demographic profile including age, sex, BMI, symptoms profile, personal history and comorbidities were recorded. HRCT was done in all cases. The score classification adopted for depicting categories as mild (<8), moderate (9-15) and sever (16-25) as per CORADS (Dutch radiology system-2019).

Glycosylated Hemoglobin of hospitalized COVID-19 patients along with random Blood sugar levels were done to know the initial glycemic status.

8 hourly blood sugar levels were carried out daily for the hospital stay and glycemic status were redone post-discharge and 3 months after hospitalization. Glycosylated haemoglobin was done initially and repeated after three months.

Statistical Analysis: The collected data was entered in Microsoft excel and analyzed using SPSS version 24th. Mean and SD was calculated for quantitative variables and proportions were calculated for categorical variables. ANOVA was applied to check significance difference of random blood sugar.

OBSERVATIONS & RESULTS:

Table 1: Distribution of patients according to Demographic profile of patients

		No. of patients	Percentage
Age-Group In years	≤30	5	6.7%
	31-40	9	12.0%
	41-50	18	24.0%
	51-60	12	16.0%
	61-70	17	22.7%
	>70	14	18.7%
	Total	75	100%
	Mean ±SD	55.04±16.83 years	
Gender	Male	45	60.0%
	Female	30	40.0%
	Total	75	100%

In present study out of 75 patients, maximum patients i.e. 18 (24.0%) were from age-group of 41-50 years, 17(22.7%) were age-group of 61-70 years and only 05(6.7%) of patients were from age-group less than 30 years. The mean age of patients was 55.04±16.83 years. The male 45 (60.0%) predominance than female 30(40.0%).

Table 2: Distribution of patients according to Covid-19 positive

		No. of patients (n=75)	Percentage
RT-PCR Positive		75	100.0
HRCT Score Classification	Mild (≤8)	29	38.7
	Moderate (9-15)	32	42.7
	Severe (16-25)	14	18.6
Mean±SD		10.83±4.69	

In present study, all 75(100%) of patients were RTPCR positive. Out of 75 patients, 32 (42.7%) were having moderate score on HRCT, 29(38.7%) were mild and 14(18.6%) were having severe category.

Table 3: Distribution of patents according to Treatment during Hospitalisation:

Treatment During Hospitalisation	No. of patients (n=75)	Percentage (%)
Remdesivir	72	96.0
Fabiflu	25	33.3
steroids	75	100.0
anticoagulants	66	88.0

All 75 hospitalized patients were given steroids during treatment at hospitalisation, 72(96.0%) of patients were given Remdesivir, 66(88.0%) were on anticoagulants and 25(33.3%) of patients were provided fabiflu.

Table 4: Distribution of patents according to Co-morbidities

Co-morbidities	No. of patients (n=75)	Percentage
Diabetic Mellitus	59	78.7
Hypertension	28	37.3
Other (IHD/CKD/DYSLIPEDEMIA)	12	16.0

59(78.7%) of patients were having Diabetic Mellitus, 28(37.3%) of patients were having hypertension and 12(16.0%) of patients were having other comorbidities.

Table 5: Comparison of Random Blood Sugar Level at Before Admission, At Admission and After Discharge Admission [Repeated ANOVA]

	Mean ± SD	F-value	P-value
Before Admission	170.01 ± 50.36	3.24	P=0.041 (S)
At Admission	187.78 ± 41.12		
After Discharge at 3 months first Followup	198.04 ± 45.96		

The mean random blood sugar level at before admission was 170.01±50.36, at admission in hospital 187.78±41.12 whereas mean random blood sugar level after discharge 3 months at first follow up was 198.04±45.96. There was statistical significance difference between in mean random blood sugar level at before admission, at admission in hospital and after discharge 3 months at first followup [p=0.041].

Table 6: Comparison of mean HbA1C level at Admission and After Discharge at first Followup

	Mean ±SD	t-value	P-value
At Admission in Hospital	7.16±0.84	2.19	P=0.034S
After Discharge 3 months at first Followup	7.96±1.30		

The mean HbA1C level at admission in hospital was 7.16±0.84, whereas mean HbA1C level after discharge 3 months at first followup was 7.96±1.30. There was statistical significance difference between in mean HbA1C level at admission in hospital and after discharge 3 months at first followup [p=0.034].

Table 7: Distribution of patients according to reasons of Dysglycemia

Questions	No. of patients (n=75)	Percentage (%)
Non Availability Of Drugs/Insulin	62	82.7
No Consultation From Physician	36	48.0
Non Availability Of Glucometer Strips	43	57.3
No Exercise / Physical Inactivity	34	45.3
Over Eating	20	26.7
Stress/Anxiety	30	40.0
Due To No Work/No Money For Drugs	31	41.3

Out of 75 patients, 62(82.7%) patients reasoned dysglycemia owing to non availability of drugs/insulin, 36(48.0%) non Consultation from Physician, 43(57.0%) patients reasoned non availability of glucometer strips, 34(45.3%) were not doing any exercise, 20(26.7%) patients were having habit of over eating , 30(40.0%) patients were having stress or anxiety and 31(41.3%) of patients were given reason of dysglycemia was due to no work/no money for drugs.

DISCUSSION

It remains unclear regarding the effect of severity of COVID-19 on glycemic parameters. In present study out of 75 patients, maximum patients i.e. 18 (24.0%) were from age-group of 41-50 years and only 05(6.7%) of patients were from age-group less than 30 years. The mean age of patients was 55.04±16.83 years. The male 45 (60.0%) predominance than female 30(40.0%). All the patients given steroids during treatment at hospitalisation, 72(96.0%) of patients given Remdesivir, 66(88.0%) were treated with anticoagulants and 25(33.3%) of patients were given fabiflu.

In present study significantly higher random blood sugar levels were observed post discharge after 3 months at first followup when compared to initial admission values (Table-5). 3 months post discharge HbA1C levels were also significantly higher as compared to initial admission values (Table-6). Montefusco, L et al [8] reported alterations in the hormone profile, both at basal levels and after stimulation testing, with higher insulin, proinsulin and C-peptide levels in patients with COVID-19 and recovered from COVID-19 as compared to healthy controls. Authors also indicated that COVID-19 also disrupts insulin signalling and beta cell function.

As viral infection and hyperglycemia adversely affect each other, the need to effectively monitor blood glucose to improve prognosis in

patients infected with COVID-19 is justifiable.

Out of 75 studied patients, 62(82.7%) patients had dysglycemia for non availability of drugs/insulin, 36(48.0%) patients could not seek advice from Physician, 43(57.0%) patients reasoned non availability of glucometer strips during pandemic, 34(45.3%) were not doing any exercise, 20(26.7%) patients admitted their changed habit of over eating , 30(40.0%) patients were having stress or anxiety and 31(41.3%) of patients argued for ill diabetic control due to no work/no money for drugs.

CONCLUSION

Present study confirmed that in COVID-19 patients the blood glucose level is increased during hospitalization and post discharge after 3 months with statistical significance. Similarly the effect of Covid-19 viral infection on HbA1c levels looked prominent in our study. COVID-19 outbreaks offer important insights that the management of blood glucose is an urgent need. Clinicians are required to pay apt attention to the blood glucose status in patients with COVID-19 with continuous regular follow-up in long post COVID-19 recovery. Future research is required to check effectiveness of improving blood glucose in COVID-19 patients. Additional researches with large sample size are necessary to confirm relationship of COVID-19 dysglysemia as the presence of diabetes also has an important impact on this association.

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