

## A study on impact of diabetes on duration of hospital stay and mortality of moderate to severe cases of severe acute respiratory illness /covid-19 in North Karnataka region

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**Abstract:** *Context:* As Diabetes is the most common co morbidity reported with covid-19 infection Severe acute respiratory syndrome corona virus -2 (SARA CoV-2) which brought about the ongoing pandemic gave opportunity to study the impact of diabetes on hospital stay and mortality of diabetic patients who contracted the corona virus infection. *Objective:* To study the duration of hospital stay and mortality rate of diabetic patients with moderate to severe covid 19 infection/severe acute respiratory illness and compare it with non diabetic patients of same disease. *Method:* This was a retrospective observational study in which the records of diabetic patients admitted with severe acute respiratory illness, during the ongoing pandemic, in Al Ameen Medical College Hospital were studied and were compared with the non diabetic patients admitted for the same. The duration of stay and mortality was compared statistically. No distinction was made with respect to type 1& 2 diabetes as they were clubbed together in the same group. *Results:* Mean duration of illness in diabetic group was 8.1 with SD of 6.9 days and in non diabetic group was 8.4 days with SD 6.5(p value= 0.8). Mortality was 32.5% among diabetics and 15.7% in non diabetics (p value= 0.001). *Conclusion:* Our study shows that the duration of hospital stay and mortality was considerably higher in diabetics than non diabetic counterparts. Therefore due attention should be given by general diabetic population to keep their blood glucose levels under control especially in this period of ongoing covid 19 pandemic.

**Keywords:** SARS CoV 2, COVID 19, Diabetes, Severe Acute Respiratory Illness.

### Introduction

India has the highest density of patients having diabetes and about to become the diabetes capitol of the world [1]. Diabetes has become endemic in India with prevalence more in urban population than the rural populace. Under this prevailing condition India braced itself to counter the pandemic with Government of India imposing strict lockdown to contain the spread of COVID-19. However the virus percolated in the society initially in the urban population and later on in the rural population.

This presented a unique opportunity to study the impact of covid-19 infection on patients with diabetes. Effect of diabetes on hospital stay and overall mortality of patients admitted for moderate to severe forms of SARS CoV2

(COVID-19) in COVID care wards of Al-Ameen Medical College was analysed retrospectively.

Diabetes was the most frequently reported comorbidity in patients admitted for moderate to severe forms of SARS CoV-2 illness. However present data on spread of COVID-19 from person to person does not show that individuals having diabetes are especially vulnerable to contract COVID 19 infection as compared to their non diabetic counterparts.

Diabetes is well known to adversely affect outcomes in a number of diseases. Patients having diabetes and on oral hypoglycaemic agents are especially susceptible for precipitation of Diabetic Ketoacidosis [2].

This in itself complicates the ongoing disease process and adversely effects the outcome. A possible factor that may play a role in increasing the risk in people affected by diabetes and/or obesity is the impaired innate and adaptive immune response, characterized by a state of chronic and low-grade inflammation [3] that can lead to abrupt systemic metabolic alteration. Diabetes has also been shown to be associated with increased time for viral clearance [4]. Membrane-associated dipeptidyl peptidase 4 (DPP4) also functions as a receptor for corona virus [5] but its clinical translation into disease process is not known [6].

**Material and Methods**

Data of patients who were admitted in Al Ameen medical college hospital was retrospectively analysed after dividing them into 2 groups i.e, those who were diabetic at the time of admission and those who did not have diabetes at the time of admission for mod to severe form of Covid-19. Type 1 and 2 diabetes patients were taken together and no distinction was made. Diabetic Patients who were having severe SARS CoV2 or were critically ill were started on insulin infusion to maintain blood glucose levels less than 200mg/dl. Blood glucose levels were regularly checked. Patients received treatment as per the guidelines provided by Government of Karnataka vide its circular [7].

Efforts were made to keep oxygen saturation above 94%. Patients were routinely screened for diabetic ketoacidosis. The data available in the form their case paper with daily notes was gone through and statistical analysis was done to see any statistical significant difference in the mortality of patients and duration of hospital stay in both the groups.

*Statistical Method Used:* All the characteristics were summarised descriptively. For continuous variables, the summary statistics of mean +/- standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and diagrammatic presentation. Chi-square test was used for association between two categorical variables. The difference of the means of analysis variables between two independent groups was tested by unpaired t test.

If the p-value was < 0.05, then the results were considered to be statically significant otherwise it was considered as not statistically significant. Data were analyzed using SPSS software v.23 (IBM statistics, Chicago, USA) and Microsoft office 2007.

**Results**

Our study showed that the duration of hospital stay and mortality was higher in the diabetic group as compared to their non diabetic counterparts (table 1 & 2). Mean duration of illness in diabetic group was 8.1 with SD of 6.9 days and in non diabetic group was 8.4 days with SD of 6.5 days(p value= 0.8) (table 2).

**Table-1: Outcome of diabetic and non diabetic patients**

Outcome	Diabetes Mellitus		Non Diabetic Mellitus	
	N	%	N	%
Death	27	32.5%	33	15.7%
Recovered	56	67.5%	177	84.3%
Total	83	100%	210	100%

**Table-2: Length of hospital stay (LOS) in days**

Diabetes Mellitus		Non Diabetic Mellitus	
Mean	SD	Mean	SD
8.1	6.9	8.4	6.5

Mortality was 32.5% among diabetics and 15.7% in non diabetics (p value= 0.001). 83 patients in the study were diabetic and 210 were non diabetic. Total number of patients studied were 293 (table 1).

**Discussion**

Diabetes has assumed epidemic status in India and has spread its tentacles over urban as well rural population. Diabetes is known to cause aberrations in the immune response [8] such that patients having diabetes generally have a guarded outcome when recovering from a critical illness. Hyperglycaemia is associated with poor recovery rates [9] and is also an independent risk factor in determination of outcome in critically ill. Diabetes is also a

state of low grade inflammation. All these was expected to come into play when a diabetic individual contracts COVID 19 infection. Our study showed that the duration of hospital stay and mortality was higher in diabetic group than non diabetic group.

Diabetes was found to be one the most common co morbidity in patients getting admitted for moderate to severe form of SARS CoV2 (COVID-19). Angiotension converting enzyme 2(ACE 2) receptors [10] as well as Membrane-associated dipeptidyl peptidase 4 (DPP4) also functions as a receptor for corona virus [5] but its clinical translation into disease process is not known [6]. Therefore it appears premature to comment what is the role of angiotensin receptor blockers and DPP4 inhibitors in the disease process.

Critically ill patients received insulin infusion as studies have shown beneficial effect on outcome in critically ill patients receiving insulin infusion. This however taxes the number of infusion pumps available at the time pandemic.

*The Virus:* SARS-CoV-2 is a positive-stranded RNA virus. It is enclosed by a protein covered lipid layer and has a single-stranded RNA as genetic material. This has 82% homology with human SARS-CoV, which causes severe acute respiratory syndrome (SARS) [11]. The virus enters the host cell after attaching it self to the ACE2 receptors by its “spike” protein. A number of organs and tissues harbour this ACE 2 receptor like lungs cardiac myocytes [12] and it appears that the more receptors are harboured the more the organ is affected. In humans main mode of transmission from one person to another appears

to be respiratory droplets [13]. Patients who are at high risk of severe COVID-19/death have several features. They are advanced age, male sex, and have underlying health issues, such as cardiovascular disease (CVD), obesity and/or type 1 diabetes mellitus (T1DM) or type 2 diabetes mellitus (T2DM) [14-16].

Our study showed that the mortality and hospital stay of the patients having diabetes and Covid 19 infection was considerably high as compared to similar patients (table 1&2) who were non diabetic at the time of admission which is in concordance with many other published studies [14-17].

### Conclusion

Our study showed that the duration of hospital stay and mortality was more among diabetic than non diabetic individuals of North Karnataka region suffering from moderate to severe form of SAR CoV2 (COVID-19) or severe acute respiratory illness. As it is expected that pandemic is going to last for another year [18] or so, hence individuals who are prediabetic should pay special attention to their prediabetic state and seek expert opinion in this regard to prevent progression from becoming overtly diabetic. Those who are already suffering from diabetes either type 1 or 2 should strictly follow lifestyle, dietary and drug recommendations as recommended by their treating doctor to improve their blood sugar levels.

Authors however concede that the limitation of this study was small number of patients studied.

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