Original Research Paper

A Comparative Study of Severity Status of Covid-19 Infection In Diabetic and Non Diabetic Patients

Authors:

Suresh K[1] ,Ramesh Gopi B[2], Swarnalatha A [3],Venkatesh R[4].

[1]Professor and Head, [2]Assistant Professor, [3]Final yr Postgraduate, [4]Senior Resident

[1,2,3,4]Department of General Medicine, SVMCH and RC.

Corresponding Author: Swarnalatha A, Department of General Medicine, SVMCH and RC.

ABSTRACT:

Background: COVID 19 definitely have created a catastrophic effect in each and every individual life. Diabetes mellitus being one of the most commonly found non communicable disease often neglected for specific care in spite of the highest complication rate and associated co morbidities. **Objectives:** To compare disease severity in diabetic and non-diabetic COVID 19 patients admitted in the hospital. **Methods:** This Retrospective Cohort study was carried out among the deceased Hospitalized COVID 19 patients admitted between March-June 2021 at Sri Venkateshwaraa Medical College Hospital and Research Centre Puducherry. The data were collected from the case records of the patients, 100 of the records became eligible to be taken in the study based on inclusion and exclusion criteria. Selected socio demographic parameters, category of COVID 19 based on severity, glucose parameters, necessity of invasive type of ventilation outcome of the disease were noted from the records. Discrete variables were expressed in proportion, continuous variables were expressed in mean ± SD. Chi-square test was used to determine the significance of association, p value < 0.05 was considered significant. **Results:** Among the 100 patient records eligible for the study, Majority of them were aged above 60 years 48(48%) and most of them were males 69(69%).The prevalence of Diabetes mellitus (65%)among COVID 19 patients was very high. Proportion of participants who had Invasive ventilation, severe form of disease and deceased patients was higher among Diabetes compared to non-diabetes participants and this difference was found to be statistically significant, having a p value of < 0.05 **Conclusion:** The present study concluded that prevalence of Diabetes mellitus among COVID 19 patients was higher and also the severity of COVID 19 was higher among Diabetes patients.

Key words: COVID 19, Diabetes mellitus

INTRODUCTION:

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), named COVID 19, has created a catastrophic effect in some aspect of each and every individual life with India being third most affected country on the whole world. The clinical spectrum was widely varying from asymptomatic/ mild respiratory symptoms to even death [1,2]This has put a major challenge on healthcare systems with a possible fear of worst may yet to come[3]. The patients with COVID 19 has various risk factors having several characteristics, including advanced age and 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) [4,5,6] Diabetes mellitus by itself is a leading cause of end-stage renal disease, adult-onset blindness, and non-traumatic lower extremity amputations.[7] It's also a known fact that Diabetes mellitus cause more disability, and at the extreme, life-threatening disorders[8] Hyperglycaemia per se in general affects the immune function; conversely, a dysregulated immunological status is linked to macrovascular complications of diabetes mellitus [9,10]. Thus, T2DM is associated with immunological dysregulation, which is potentially equivalent to accelerated ageing, and could therefore potentially explain the poor prognosis in patients with diabetes mellitus and COVID-19[11] With all this above background the study was planned with the following objectives

OBJECTIVES:

To compare disease severity in diabetic and non-diabetic COVID 19 patients admitted in the hospital

MATERIALS AND METHODS:

Study design: Retrospective cohort study

Study population: Type 2 DM patients and non diabetic patients with COVID 19 infection diagnosed or ruled out using RTPCR testing admitted at Sri Venkateshwaraa Medical hospital and research centre between March 2021-June 2021

Inclusion Criteria: Patients > 18 yrs of age (both diabetic and non diabetic patients) diagnosed with COVID 19 infection proved by Covid 19 RTPCR

testing and HRCT findings suggestive of COVID 19 infection, admitted between March 2021-June 2021.

Exclusion Criteria: Other immunocompromised states(HIV, steroid therapy ,autoimmune diseases ,cancer ,chemotherapy)

Sampling Technique: Purposive sampling

Sample Size: A total of 100 patients were admitted fulfilling the eligibility criteria.

Data collection method: Semi structured questionnaire

RESULTS:

The mean age of the study participants was 55.5 ± 12.3 years.

Table 1: Distribution of participants based on socio-demographic variables (n=100)

PARAMETERS	FREQUENCY n (%)
Age (in years)	
< 40 years	8 (8%)
40-60 years	44(44%)
>60 years	48(48%)
Age (mean ± SD) : 55.5 ± 12.3 years	
Sex	
Male	69(69%)
Female	31(3%)
Residence	
Urban	32(32%)
Rural	68(68%)
Socio economic status	
Class I	33(33%)
Class II	50(50%)
Class III	10(10%)
Class IV	7(7%)

Among the 100 participants, majority of them re aged above 60 years, 48% and most of the participants are males (69%) and more than 2/3rd of the participants were rural residents (68%) and more number of participants belonged to Class II socio economic class as classified by modified BG Prasad classification and only 7% of them belonged to Class IV socio economic class.[Table 1]

Figure 1: Distribution of participants based on presence of Diabetes mellitus (n=100)
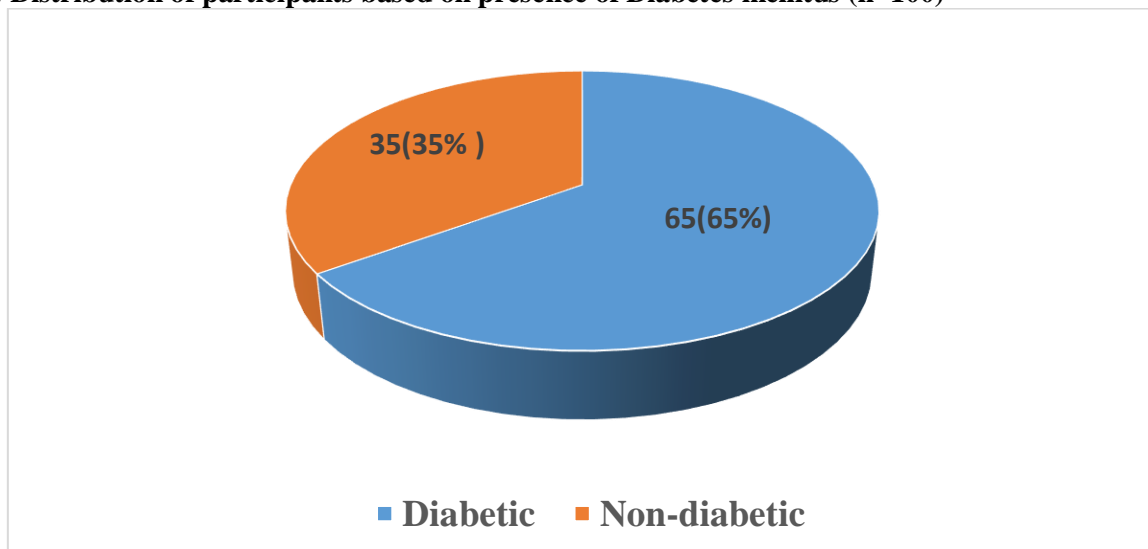
Majority of the participants were Diabetic (65%) and 35% of them are non-diabetic

Table 2: Distribution based on mean blood sugar levels and number of days of hospital admission (n=100)

Parameters	Mean ± SD
Fasting Blood Sugar (mg/dl)	195 ±94
Post Prandial Blood Sugar (mg/dl)	277 ±135
Random Blood Sugar(mg/dl)	228 ±112
Glycated Hemoglobin (g%)	7.77 ±1.84
Total number of Hospital Admission	7.5 ±4.5

The mean Blood glucose parameters like, Fasting Blood sugar, Post Prandial Blood Sugar, Random Blood Sugar, Glycated Haemoglobin were 195 ±94 mg/dl, 277 ±135mg/dl, 228 ±112 mg/dl, 7.77 ±1.84 g% respectively [Table 2]

Table 3: Distribution based on association between Severity of COVID 19 and Diabetes mellitus (n=100)

Parameters	COVID 19 SEVERITY		Significance
	Mild	*Severe*	Chi square value
Diabetic	21(32%)	44(68%)	23.25
Non-diabetic	29(83%)	6(17%)	(p value ,0.0001)

Among the 100 study participants included for the study majority of them are Diabetic, constituting 65% of the population, while 35 % of them are non-diabetic [Figure 1] On categorizing the participants based on the COVID 19 severity, equal proportion (50%) of participants were classified under mild and severe category. In order to find the association between presence of Diabetes mellitus and the COVID 19 severity, it was found that the proportion of participants with severe COVID 19 was higher among patients with Diabetes mellitus, compared to patients without Diabetes mellitus and this difference was found to be statistically significant with the chi square value of 23.25, p value of 0.0001 (p value <0.05) [Table 3]

Table 4: Distribution based on association between Diabetes mellitus need for Invasive Ventilation (n=100)

Parameters	INVASIVE VENTILATION		Significance
	Needed	**Not needed**	Chi square value
Diabetic	49(75%)	16(25%)	34.19
Non-diabetic	5(14%)	30(86%)	(p value, 0.00012)

On categorizing the participants based on the need of Invasive type of Ventilation, it was noted that the proportion of participants who needed Invasive type of Ventilation was higher (54%) than the proportion of participants who didn't require (46%) during the study period. In order to find the association between presence of Diabetes mellitus and the need of Invasive type of Ventilation, it was found that the proportion of participants who needed Invasive Ventilation was more 49 (76%) among diabetic compared to non-diabetic 5 (14%) and this difference was found to be statistically significant with the chi square value of 34.19, p value of 0.00012 (p value <0.05) [Table 4]

Table 5: Distribution based on association between Diabetes mellitus and COVID 19 disease outcome (n=100)

Parameters	DISEASE OUTCOME		Significance
	Survived	**Dead**	Chi square value
Diabetic	16 (24%)	49 (76%)	28.3
Non-diabetic	28(80%)	7(20%)	(p value, 0.00018)

On categorizing the participants based on the disease outcome, it was noted that the proportion of participants who died (56%) was higher than the proportion of participants who survived (44%) during

the study period. In order to find the association between presence of Diabetes mellitus and the disease outcome, it was found that the proportion of participants died due to COVID 19 was more 49(76%) among diabetics compared to non-diabetic 7(20%) and this difference was found to be statistically significant with the chi square value of 28.3,p value of 0.00018 (p value <0.05) [Table 5]

DISCUSSION

Hasabo EA et al[3], in their study found out that, the mean age of the participants was 55.8 ± 18.4 years, and just over half of them ($n = 126$, 51.9%) were 60 years or above. More than half of the participants were males ($n = 145$, 59.7%) [3] In the present study findings, the mean age of the study participants was 55.5 ± 12.3 years, which was in close proximity with the above study findings, the proportion of participants was aged > 60 years was 48%. Abdi et al [5], in their study found out that, prevalence of diabetes in COVID-19 patients to be 14.5%. The present study had higher prevalence of Diabetes mellitus among COVID 19 patients, which was as high as 65%,this difference as compared to the above study could be due to the difference in geographic location, increased awareness among the patients and increased diagnostic facility and managing facility Severity of symptoms and the death rate is higher among patients with both diabetes and COVID-19 [5] .Similarly, Liu Z et al[4], reported that, the percentage of patients with diabetes among the severe and critical COVID-19 cases were higher than those among the mild or general cases (89.2%, 10.8 vs. 0%, p = 0.001).[4] The current study findings also supported the above reports of Abdi et al and Liu Z et al, concluding that the proportion of participants who was classified to have severe COVID 19 was higher among Diabetic patients (68%) as compared to non-diabetic patients (17%) and this difference was found to be statistically significant, having a p value of 0.0001

CONCLUSION:

The present study concludes that the proportion of COVID 19 patients categorized to have the severe form of the disease, the necessity of Invasive Ventilation and number of patients who died due to various complications was higher among Diabetics than non-diabetics.This finding though were just supporting the previous study findings, the prevalence of 65% of Diabetes among the COVID 19 patients indicate the alarming concern for the effective preventive and control measures for the most common non communicable disease Diabetes mellitus, in order to prevent the health catastrophe for any diseases in future

REFERENCES

1. *Ministry of Health and Family Welfare, Government of India, COVID-19 INDIA*. [Last updated on 2020 Jul 15, 08:00 IST; Last cited on 2020 Jul 15]. Available from: https://www.mohfw.gov.in.

2. *World Health Organization: WHO Coronavirus Disease (COVID-19) Dashboard.* [Last updated on 2020 Jul 15, 08:00 IST; Last cited on 2020 Jul 15]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019 .

3. Shivani VK, Lila AR,Bandgar TR. Type 2 diabetic Asian Indians and COVID-19: Lessons learnt so far from the ongoing pandemic. J Postgrad Med. 2020 Oct-Dec; 66(4): 179–181.

4. Holman, N. et al. Risk factors for COVID-19-related mortality in people with type 1 and type 2 diabetes in England: a population-based cohort study. Lancet Diabetes Endocrinol. 8, 823–833 (2020).

5. Grasselli, G. et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy region, Italy. JAMA 323, 1574–1581 (2020).

6. Goyal, P. et al. Clinical characteristics of Covid-19 in New York City. N. Engl. J. Med. 382, 2372–2374 (2020).

7. Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract 2011;94(3):311–21.

8. Hamano K, Nakadaira I, Suzuki J, Gonai M. N-terminal fragment of probrain natriuretic peptide is associated with diabetes microvascular complications in type 2 diabetes. Vascular Health Risk Manage. 2014;10:585.

9. Mehta, P. et al. COVID-19: consider cytokine storm syndromes and immunosuppression. Lancet.2020: 395;1033–1034

10. Zhang, Y. et al. Coagulopathy and antiphospholipid antibodies in patients with Covid-19. N. Engl. J. Med.2020;382

11. Lim S, Bae JH, Kwon HS, Nauck MA. COVID-19 and diabetes mellitus: from pathophysiology to clinical management. *Nat Rev Endocrinol*. 2021;17(1):11-30

12. Hasabo EA, Ayyad FA, Alam SAM, Noureldaim MK, Abdallah TA etal.. Clinical manifestations, complications, and outcomes of patients with COVID-19 in Sudan: a multicenter observational study. Trop Med Health. 2021 Nov 14;49(1):91.

13. Abdi A, Jalilian M, Sarbarzeh PA, Vlaisavljevic Z. Diabetes and COVID-19: A systematic review on the current evidences. *Diabetes Res Clin Pract*. 2020;166:108347

14. Liu Z, Li J, Huang J, et al. Association Between Diabetes and COVID-19: A Retrospective Observational Study With a Large Sample of 1,880 Cases in Leishenshan Hospital, Wuhan. *Front Endocrinol (Lausanne)*. 2020;11:478