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COMPARISON OF CURB-65 SCORES IN NON-DIABETIC AND DIABETIC SUBJECTS HOSPITALIZED FOR COVID-19 INFECTION

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Abstract

Background: Diabetes mellitus has been established as a contributory factor for comorbidity in subjects with COVID-19 owing to diabetics being at high infection susceptibility from different bacteria and viruses including those of the respiratory tract. CURB 65 scores are an easier system among the various scoring systems developed to assess CAP risk.

Aim: To record and comparatively analyze the CURB-65 scores in non-diabetic and diabetic subjects hospitalized for COVID-19 infection in an Indian health care center.

Methods: In 280 subjects admitted for COVID-19 infection, glycemic state and CURB-65 scores were evaluated. The subjects were grouped as having mild, moderate, or severe illnesses based on the CURB-65 scoring. Also, ICU admission, the requirement of a ventilator, hospitalization duration, and mortality rates were assessed. All subjects were followed till discharge or death, whichever was early.

Results: Mild CURB-65 was seen for 65.21% (n=90) diabetic subjects and 97.18% (n=138) non-diabetic subjects. 30.43% (n=42) diabetic subjects and 2.81% (n=4) non-diabetic subjects had CURB-65 scores as moderate. ICU admission was needed in 24.63% (n=34) diabetic subjects and in 5.63% (n=8) non-diabetic subjects (p=0.002). Ventilatory support was needed in 18.84% (n=26) diabetic subjects in the study and in 4.22% (n=6) non-diabetic subjects. This difference was statistically significant with p=0.007. 24.63% (n=34) diabetic subjects died and in non-diabetic (p<0.0001). The mean duration of hospital stay was 9.23±5.2 days in diabetic subjects and 7.03±4.28 days in nondiabetic subjects (p=0.005).

Conclusion: Increased and higher values of CURB-65 scores were seen for subjects having diabetes mellitus and COVID-19 infection compared to non-diabetic subjects with COVID-19 infection. Also, the disease severity was more in subjects with diabetes mellitus and COVID-19 compared to non-diabetics.
Keywords: COVID-19, coronavirus, CURB 65, diabetes mellitus, non-diabetic.

Introduction

COVID-19 is a pandemic disease that is an inflammatory, thrombogenic and viral disease. COVID-19 infection is linked to various risk factors including obstructive sleep apnoea, metabolic syndrome, obesity, diabetes mellitus, and advanced age. These factors are associated with poor outcomes in subjects with COVID-19 infection.[1] Diabetes mellitus is the most common concomitant disease in COVID-19 subjects and is associated with high disease severity in COVID-19 infection pneumonia subjects and high mortality rates. In diabetic subjects, decreased lung function, low-grade chronic systemic inflammation, and immune dysfunction are commonly seen. If a diabetic subject is hospitalized, it is vital to predicting the risk of developing any critical or severe illness. Early detection of this predictability can help in better treatment and low mortality rates.[2]

COVID-19 pandemic is seen associated with high rates of CAP (community-acquired pneumonia). Various prognostic rating systems have been used to assess subjects at high mortality risk. PSI (pneumonia severity index) and CURB 65 scores are the two most common scoring systems for predicting mortality from community-acquired pneumonia. The use of PSI is limited and usually not done in primary care environments, emergencies, and overwhelmed hospitals due to the need for recording 20 variables and the complexity of the scoring system.[3]

The CURB-65 scoring criteria on the other hand utilize the 5 variables making it simpler. These criteria include age ≥65 years, blood pressure (B) (systolic ≤90 mmHg and ≤60 mmHg), respiratory rate (R) of ≥30/min, urea >7 mmol/L (U), and confusion (C). Each component is given a score of 0 or 1 making a total score of 5. CURB-65 scores accurately and comprehensively predict the 30-day death rate in subjects with CAP. CURB-65 scores also provide a wide range of sensitivities for specificity.[4] Also, CURB-65 scores allow patient stratification into 3 different treatment modalities depending on the scoring where a score of 0-1 shows a low risk of 30–day mortality (0.7–3.2%) and subjects can be managed in the Outpatient Department, a score of 2 depicts intermediate risk (13%) and subjects need to be hospitalized, and 3-5 shows a high risk of 30–day mortality (17–57%) to be considered for ICU admission.[5,6]

Previous literature data has shown that CURB-65 has limited relevance in guiding the treatment of the subjects as Outpatient, hospitalized, or ICU admission. Also, the application of CURB-65 scores in subjects with COVID-19-positive diabetic subjects is unclear.[7] Also, studies have shown that COVID-19 subjects with comorbidities and age >65 years have elevated CURB-65 scores. Hence, the present study aimed to record and comparatively analyze the CURB-65 scores in non-diabetic and diabetic subjects hospitalized for COVID-19 infection in an Indian health care center.

Materials and Methods

The present cross-sectional study aimed to record and comparatively analyze the CURB-65 scores in non-diabetic and diabetic subjects hospitalized for COVID-19 infection in an Indian health care center. The study was done at Department of General Medicine, Gulbarga Institute of Medical Science, Kalaburagi, Karnataka. The study population was comprised of the subjects admitted with COVID-19 to the Institute. After explaining the detailed study design, informed consent was taken from all the subjects or their attendants in both verbal and written format.

The study included a total of 280 subjects with COVID-19 infections hospitalized in the defined study period. These 280 subjects were divided into two groups diabetics (n=138) and non-diabetics (n=142) with COVID-19 infection. The study included both subjects with Type 1 and Type 2 diabetes mellitus. The status of diabetes mellitus was governed based on previous or recent biochemical and laboratory analysis based on the definition by WHO (World Health Organization) with or without the treatment.

The covid-19 status was confirmed by either radiologic findings of CORADS 4/5 or positive RT-PCR (reverse transcription-polymerase chain reaction) of the specimens collected from the upper respiratory tract as either nose or throat swabs. The subjects who reported to the hospital with mild symptoms were only included in the study. The exclusion criteria for the study were subjects with gestational diabetes, pre-diabetic subjects, and subjects who were not willing to participate in the study.

After the final inclusion of the study subjects, detailed history was recorded for all the subjects followed by a general examination. Demographic data including gender and age of the subjects were recorded along with essential blood biochemistry, consciousness state, glycemic status including RBS (random blood sugar), and other triage factors including heart rate, oxygen saturation at rest, respiratory rate, blood pressure, and fever were recorded. CURB-65 scores were then calculated for all the subjects of both groups.

The data collected were assessed statistically using logistic regression and multivariate statistical techniques. The data were presented in tabulated and descriptive formats. SPSS version 22.0, 2013, Armonk, NY: IBM Corp and chi-square test were utilized. The data were expressed as mean and standard deviations and as percentages and numbers with a 0.05% significance level.

Results

The present cross-sectional study aimed to record and comparatively analyze the CURB-65 scores in non-diabetic and diabetic subjects hospitalized for COVID-19 infection in an Indian health care center. The study included a total of 280 subjects with COVID-19 infections divided into two groups diabetics (n=138) and non-diabetics (n=142) with COVID-19 infection. The mean age of diabetic study subjects was 43.4±2.63 years and 44.2±3.12 years which was comparable. There were 82 male and 56 female diabetic subjects in the present study and 90 male and 52 female non-diabetic subjects in the present study. The majority of

diabetic subjects were in the age range of 51-60 and 61-70 years with 52 subjects followed by 18 subjects in >70 years, 12 subjects in 41-50 years, and at least 4 subjects in 31-40 years. In non-diabetics, the majority of 36 subjects were between the age of 61-70 years, 34 subjects between 41-50 years, 24 subjects in 51-60 years, 22 subjects <30 years of age, 20 subjects in 31-40 years of age, and 6 subjects in >70 years of age as shown in Table 1.

On assessing the CURB-65 scores in diabetic and non-diabetic study subjects, it was seen that in the mild CURB-65 scores group there were 65.21% (n=90) diabetic subjects and 97.18% (n=138) non-diabetic subjects with a total of 81.42% (n=228) study subjects. 30.43% (n=42) diabetic subjects and 2.81% (n=4) non-diabetic subjects had CURB-65 scores as moderate with a total of 16.42% (n=46) study subjects. For CURB-65 scores as severe, there were 4.34% (n=6) diabetic subjects and no non-diabetic subjects. This difference was statistically significant for mild, moderate, and severe CURB scores in diabetic and non-diabetic subjects with $p<0.001$ (Table 2).

Concerning various study parameters, ICU admission was needed in 24.63% (n=34) diabetic subjects and in 5.63% (n=8) non-diabetic subjects which were significantly higher in diabetics compared to non-diabetics with $p=0.002$. Ventilatory support in these ICU subjects was needed in 18.84% (n=26) diabetic subjects in the study and 4.22% (n=6) non-diabetic subjects in the study. This difference was statistically significant with $p=0.007$. In these subjects, all admitted ICU subjects, 24.63% (n=34) of diabetic subjects died and in non-diabetic subjects, no subject died with 0 mortality which was statistically significant with $p<0.0001$ as shown in Table 3. The mean duration of hospital stay was 9.23±5.2 days in diabetic subjects and 7.03±4.28 days in non-diabetic subjects which was a statistically significant difference with $p=0.005$.

On assessing the mortality rates in the study subjects based on the CURB-65 scores, it was seen that no subject with mild CURB-65 scores died from COVID-19 with or without diabetes. For moderate CURB-65 scores, 36 subjects died from COVID-19 infection, and 2 subjects died with the CURB-65 severe scores which were statistically significant differences with $p<0.001$ as shown in Table 4.

Discussion

The present cross-sectional study aimed to record and comparatively analyze the CURB-65 scores in non-diabetic and diabetic subjects hospitalized for COVID-19 infection in an Indian health care center. The study included a total of 280 subjects with COVID-19 infections divided into two groups diabetics (n=138) and non-diabetics (n=142) with COVID-19 infection. The mean age of diabetic study subjects was 43.4±2.63 years and 44.2±3.12 years which was comparable. There were 82 male and 56 female diabetic subjects in the present study and 90 male and 52 female non-diabetic subjects in the present study. The majority of diabetic subjects were in the age range of 51-60 and 61-70 years with 52 subjects followed by 18 subjects in >70 years, 12 subjects in 41-50 years, and at least 4 subjects in 31-40 years. In non-diabetics, the majority of 36 subjects were between the age of 61-70 years, 34 subjects

between 41-50 years, 24 subjects in 51-60 years, 22 subjects <30 years of age, 20 subjects in 31-40 years of age, and 6 subjects in >70 years of age. These findings were comparable to the studies of Nikniaz Z et al[8] in 2021 and Guo J et al[9] in 2020 where authors assessed subjects with demographics comparable to the present study.

The study results showed that for CURB-65 scores in diabetic and non-diabetic study subjects, it was seen that in the mild CURB-65 scores group there were 65.21% (n=90) diabetic subjects and 97.18% (n=138) non-diabetic subjects with a total of 81.42% (n=228) study subjects. 30.43% (n=42) diabetic subjects and 2.81% (n=4) non-diabetic subjects had CURB-65 scores as moderate with a total of 16.42% (n=46) study subjects. For CURB-65 scores as severe, there were 4.34% (n=6) diabetic subjects and no non-diabetic subjects. This difference was statistically significant for mild, moderate, and severe CURB scores in diabetic and non-diabetic subjects with $p<0.001$. These results were consistent with the findings of de Almeida-Pititto B et al[10] in 2002 and Satici C et al[11] in 2020 where authors reported comparable CURB-65 scores in diabetic and non-diabetic subjects.

For various study parameters, ICU admission was needed in 24.63% (n=34) diabetic subjects and in 5.63% (n=8) non-diabetic subjects which were significantly higher in diabetics compared to non-diabetics with $p=0.002$. Ventilatory support in these ICU subjects was needed in 18.84% (n=26) diabetic subjects in the study and 4.22% (n=6) non-diabetic females in the study. This difference was statistically significant with $p=0.007$. In these subjects, all admitted ICU subjects, 24.63% (n=34) of diabetic subjects died and in non-diabetic subjects, no subject died with 0 mortality which was statistically significant with $p<0.0001$. The mean duration of hospital stay was 9.23±5.2 days in diabetic subjects and 7.03±4.28 days in non-diabetic subjects which was a statistically significant difference with $p=0.005$. These findings were in agreement with the results of Han M et al[12] in 2021 and Karimi F et al[13] in 2021 where hospital stay was higher in diabetics with more mortality rates, need for ventilation, and ICU admission in subjects with COVID-19 infection and diabetes.

Concerning the mortality rates in the study subjects based on the CURB-65 scores, it was seen that no subject with mild CURB-65 scores died from COVID-19 with or without diabetes. For moderate CURB-65 scores, 36 subjects died from COVID-19 infection, and 2 subjects died with the CURB-65 severe scores which were statistically significant differences with $p<0.001$. These results were in line with the findings of Nguyen Y et al[14] in 2020 and Bradley J et al[15] in 2021 where authors reported comparable mortality in subjects with COVID-19 as in the present study.

Conclusion

Considering its limitations, the present study concludes that Increased and higher values of CURB-65 scores were seen for subjects having diabetes mellitus and COVID-19 infection compared to non-diabetic subjects with COVID-19 infection. Also, the disease severity was more in subjects with diabetes mellitus and COVID-19 compared to non-diabetics. The study

had a few limitations of smaller sample size, cross-sectional nature, and short monitoring warranting further longitudinal studies.

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Tables

Characteristics	**Diabetes**	
	Yes (n=138)	**No (n=142)**
Mean age (years)	43.4±2.63	44.2±3.12
Gender		
Males	82	90
Females	56	52
Age range (years)		
<30	0	22
31-40	4	20
41-50	12	34
51-60	52	24
61-70	52	36
>70	18	6

Table 1: Demographic data of diabetic and non-diabetic study subjects

CURB-65 scores	**Diabetes**		**Total**	**p-value**
	Yes n=138 (%)	**No n=142 (%)**		
Mild	90 (65.21)	138 (97.18)	228 (81.42)	**<0.001**
Moderate	42 (30.43)	4 (2.81)	46 (16.42)	
Severe	6 (4.34)	0	6 (2.14)	
Total	138 (10 0)	142 (100)	280 (100)	

Table 2: Comparison of CURB-65 scores in diabetic and non-diabetic study subjects

Parameter	**Diabetes**			**p-value**
	Yes n=138 (%)	**No n=142 (%)**	**Total**	
ICU				

Yes	34 (24.63)	8 (5.63)	42 (15)	**0.002**
No	104 (75.36)	134 (94.36)	238 (85)	
Total	138 (100)	142 (100)	280 (100)	
Ventilation				
Yes	26 (18.84)	6 (4.22)	32 (11.42)	**0.007**
No	112 (81.15)	136 (95.77)	248 (88.57)	
Total	138 (100)	142 (100)	280 (100)	
Mortality				
Yes	34 (24.63)	0	34 (12.14)	**<0.0001**
No	104 (75.36)	142 (100)	246 (87.85)	
Total	138 (100)	142 (100)	280 (100)	

Table 3: Comparison of various parameters in diabetic and non-diabetic study subjects

CURB-65 scores	**Mortality**		**Total**	**p-value**
	Yes	**No**		
Mild	0	228	228	**<0.001**
Moderate	10	36	46	
Severe	4	2	6	
Total	14	266	280	

Table 4: Mortality rates based on CURB-65 scores in study subjects