EVALUATION OF COVID-19 OUTCOMES AND MORTALITY IN GASTROINTESTINAL PATIENTS WITH OR WITHOUT CO-MORBIDITIES DURING INITIAL PANDEMIC WAVE: WHAT HAVE WE LEARNT SO FAR?

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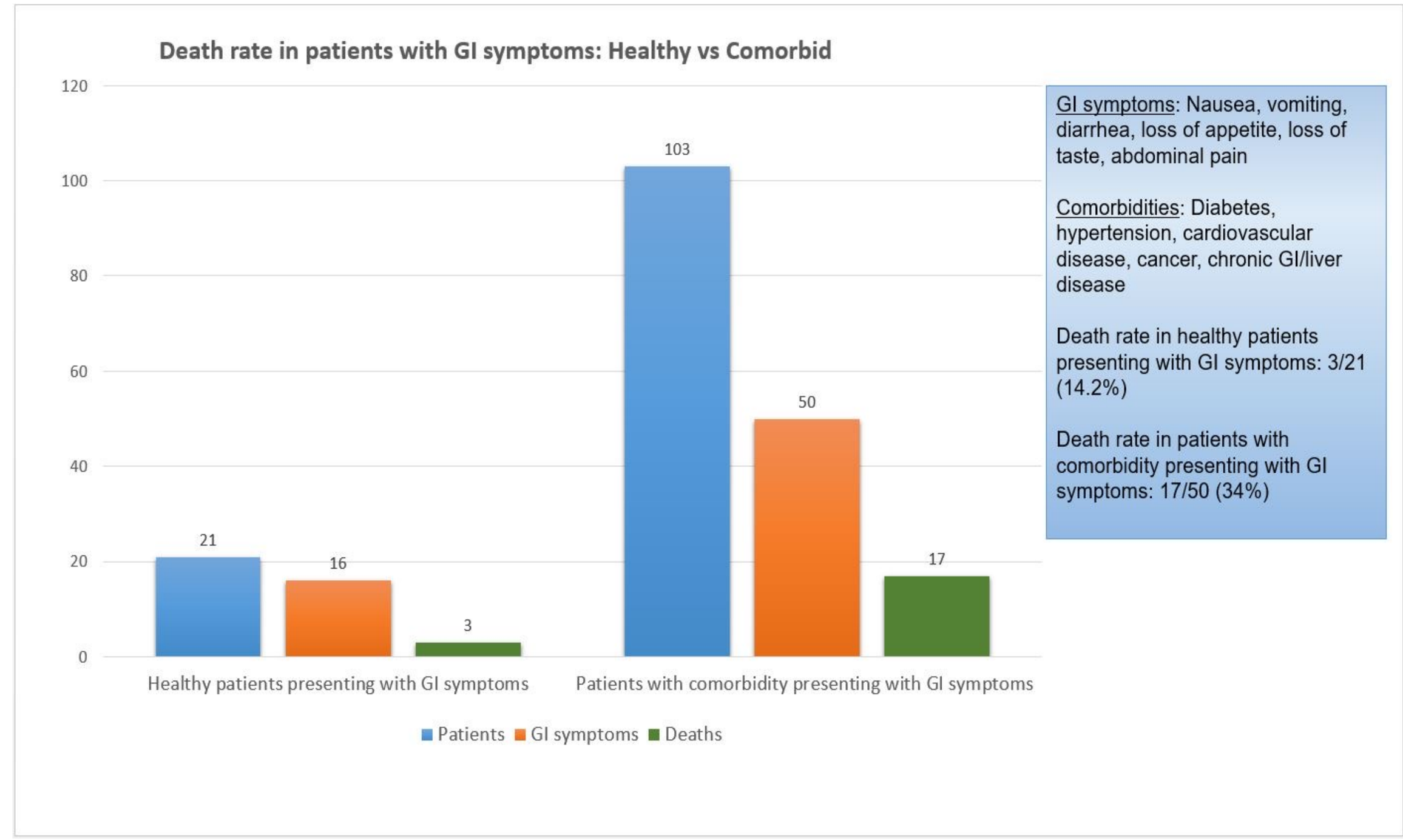
INTRODUCTION

- SARS-CoV-2 has affected over 180 countries, infecting humans of all genders, ethnicities, age groups, and spreading through communities like fire, causing mass death and hysteria worldwide.
- As this virus continues to mutate and cases evolve, it has been seen that people with underlying chronic diseases are more likely to get infected and become severely ill, often leading to death.
- Gastrointestinal (GI) symptoms are second most common presenting symptoms of COVID-19 infection. This study evaluates outcomes in COVID-19 patients with comorbidities (diabetes, hypertension, cardiovascular disease, cancers, chronic GI, or lung disease) and GI symptoms like nausea, loss of appetite or taste, vomiting, diarrhea, abdominal pain during early pandemic wave.

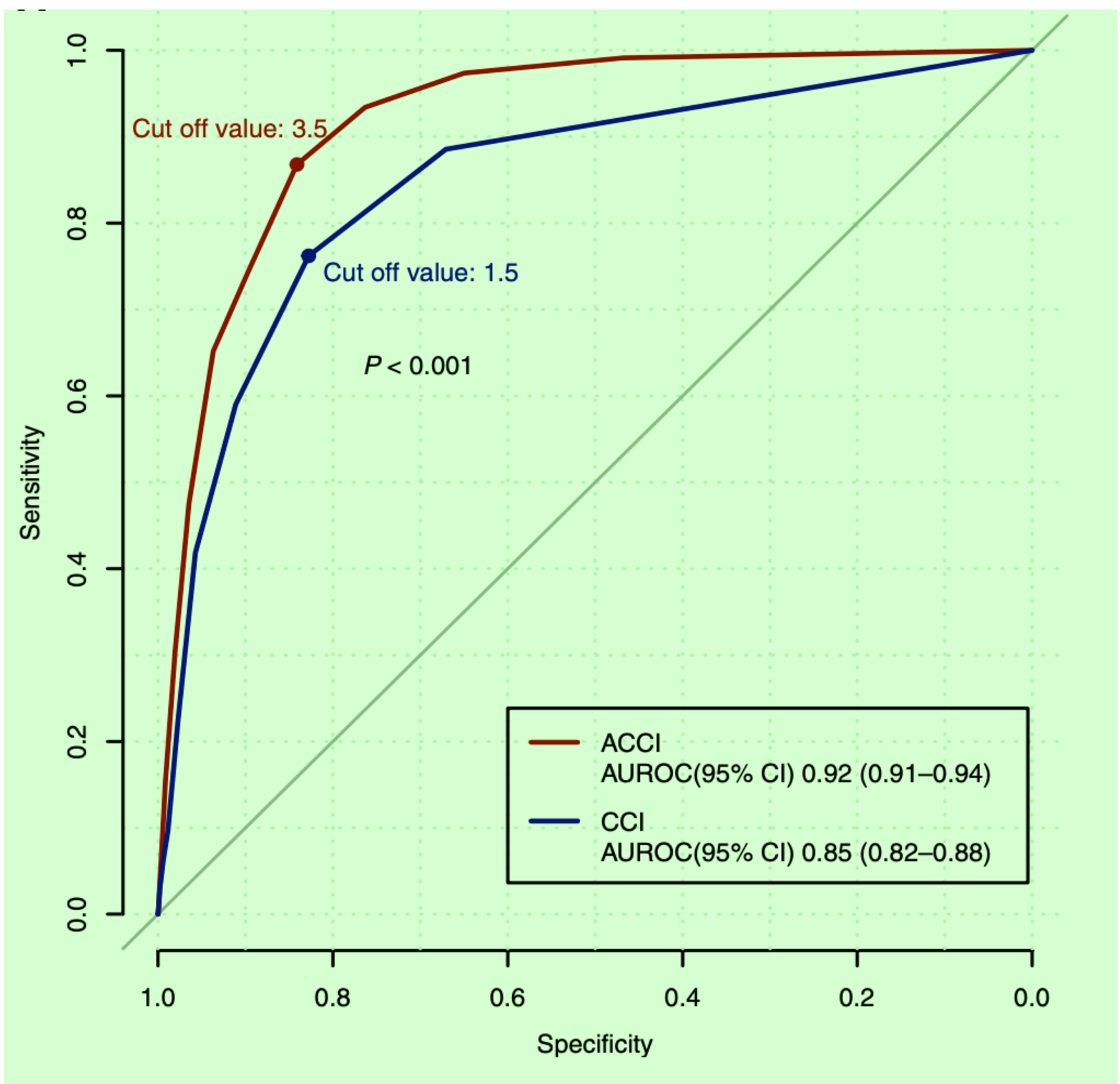
METHODS

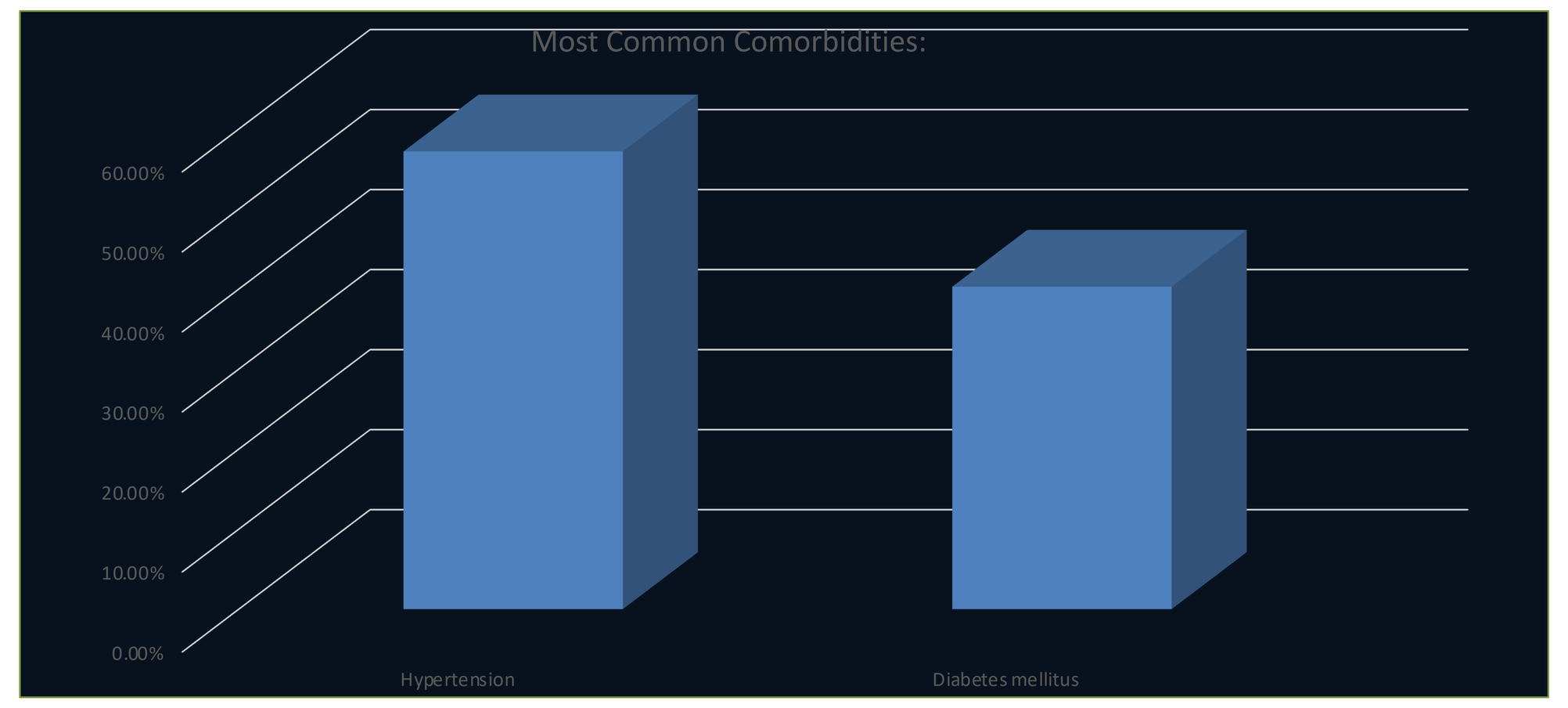
- We conducted a retrospective cohort study of all confirmed COVID-19 adult patients >18 years of age, admitted in Jacobi Medical Center, Bronx, NY during the first pandemic wave, for a period of 6 weeks during March-April 2020.
- We extracted demographic, clinical and outcomes data from electronic medical records of patients. Primary outcomes were death, discharge, or transfer to another center in patients with or without GI symptoms and co-morbidities.
- Descriptive statistics considered proportions, means and medians. The Chi-square and Fisher's exact tests were used in determining associations between variables. We calculated the odds ratios of mortality according to co-morbidities in these patients with and without age and sex adjustment.
- The predictive value of the original Charlson comorbidity index (CCI) and the age adjusted CCI (ACCI) for mortality in these patients was analyzed using the receiver operating characteristic (ROC) curve. P-value ≤0.05 was considered statistically significant.

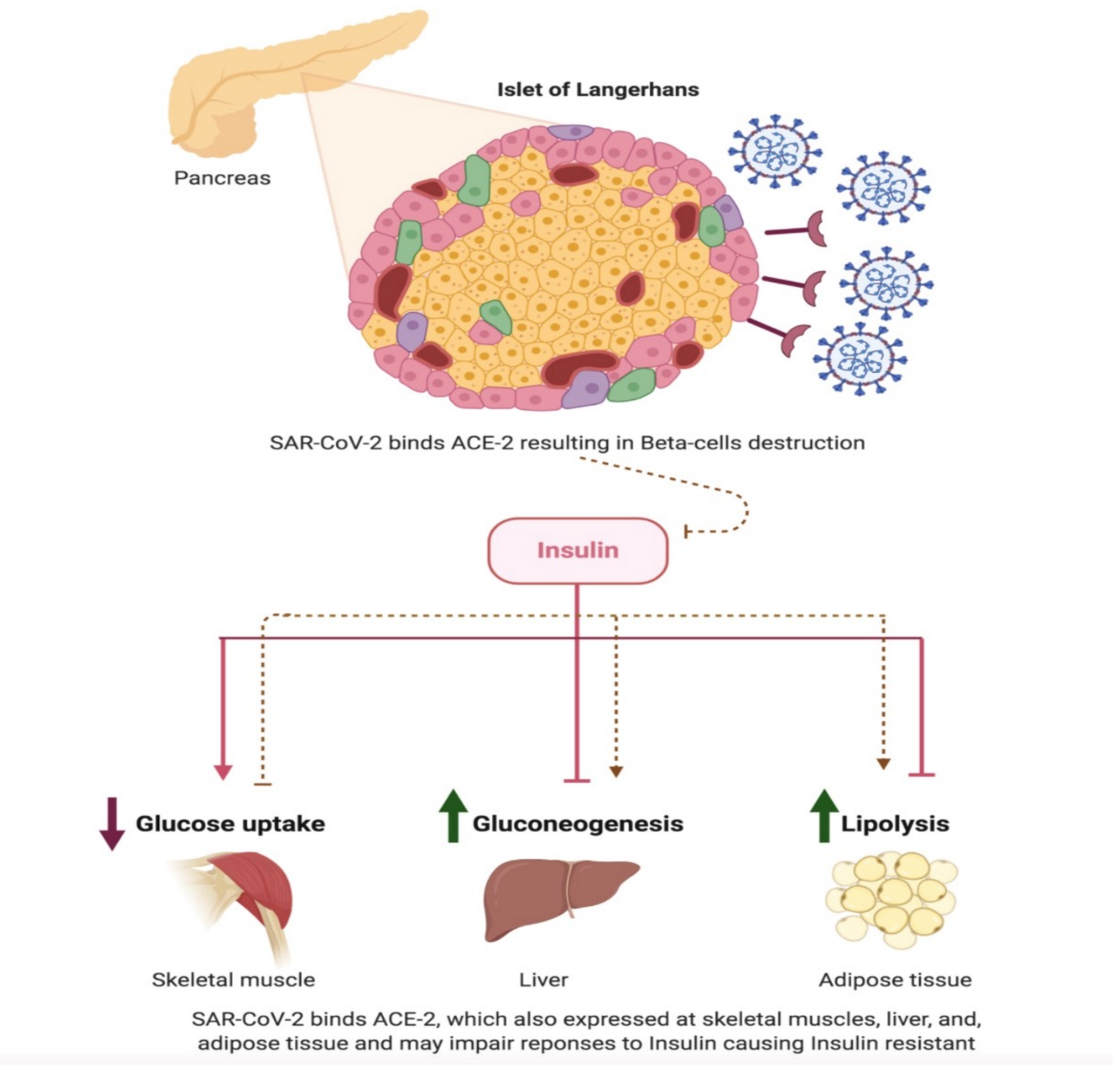
IMAGES


Death rate in patients with GI symptoms: Healthy vs Comorbid
Healthy patients presenting with GI symptoms
Patients with comorbidity presenting with GI symptoms
Patients
GI symptoms
Deaths
GI symptoms: Nausea, vomiting, diarrhea, loss of appetite, loss of taste, abdominal pain
Comorbidities: Diabetes, hypertension, cardiovascular disease, cancer, chronic GI/liver disease
Death rate in healthy patients presenting with GI symptoms: 3/21 (14.2%)
Death rate in patients with comorbidity presenting with GI symptoms: 17/50 (34%)

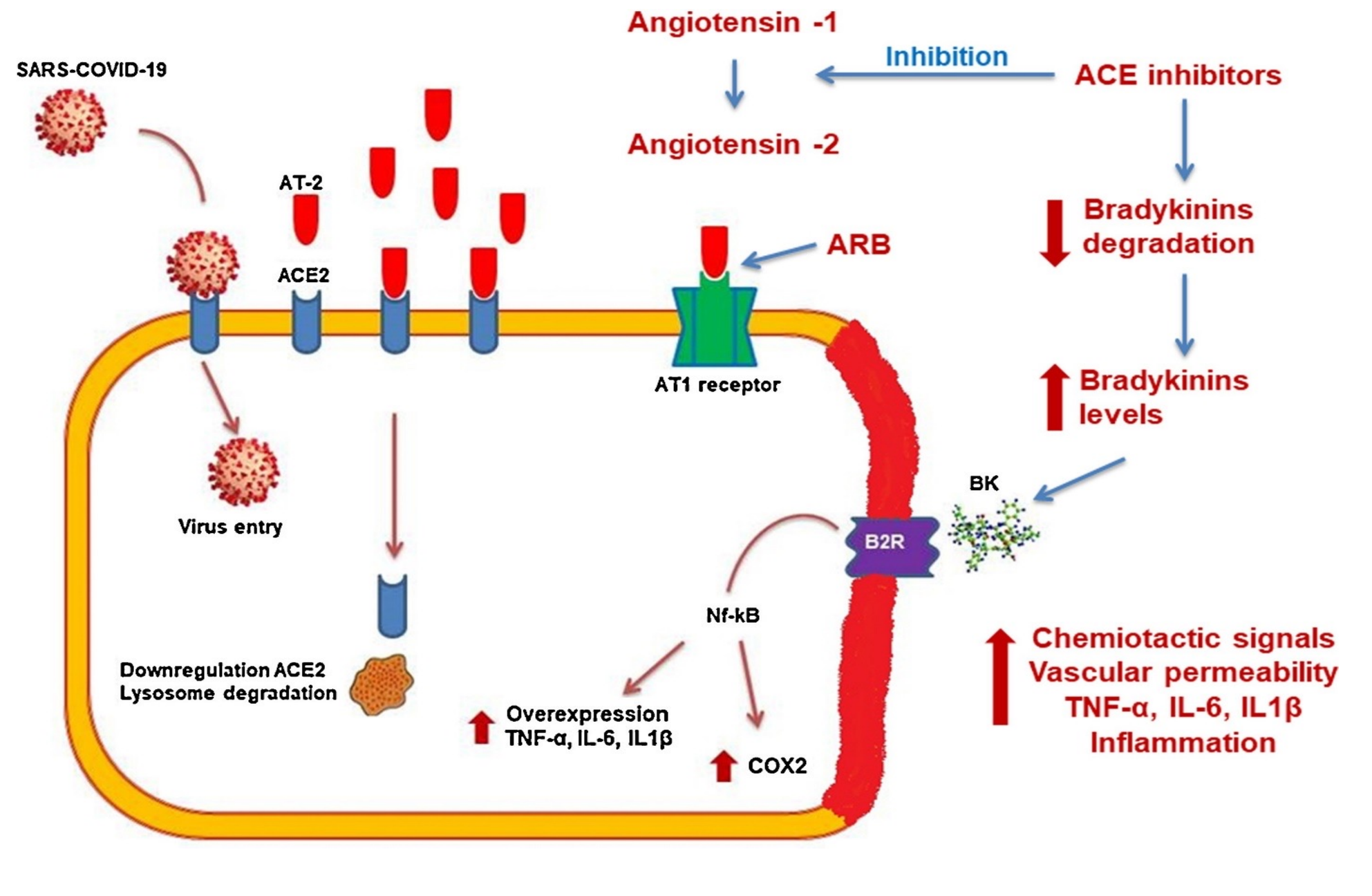
DEMOGRAPHICS	TYPES	TOTAL NUMBER	PERCENTAGE
Total population	Healthy with COVID-19	24	19.35%
	COVID-19 with comorbidities	100	80.65%
Age (years)	Range	28-100	-
	Median	61	
Sex	Male	80	64.5%
	Female	44	35.5%
Race	Asian	8	6.45%
	African American	32	25.8%
	Caucasian	11	8.9%
	Hispanic	36	29%
	Unknown	14	11.3%
	Declined/Other	23	18.5%
Smoker	Yes	31	25%
	No	93	75%
Comorbidities	Hypertension	71	57.2%
	Diabetes	50	40.3%






Islet of Langerhans
Pancreas
SAR-CoV-2 binds ACE-2 resulting in Beta-cells destruction
Insulin
Glucose uptake
Gluconeogenesis
Lipolysis
Skeletal muscle
Liver
Adipose tissue
SAR-CoV-2 binds ACE-2, which also expressed at skeletal muscles, liver, and adipose tissue and may impair reponses to Insulin causing Insulin resistant

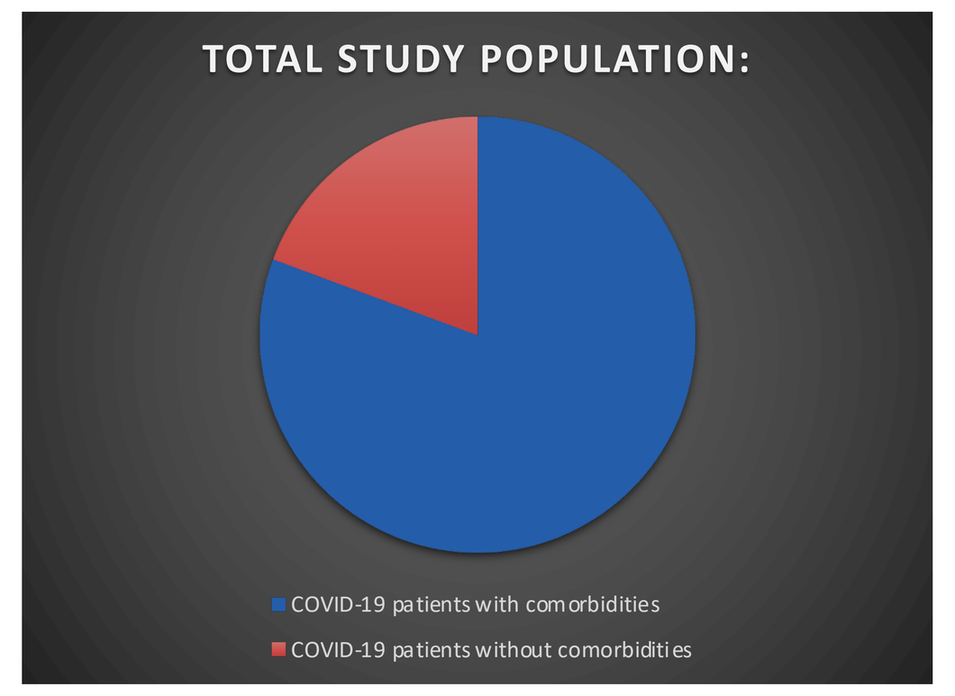
Pathophysiology of diabetes in COVID-19 infection: SARS-CoV-2 interaction with Angiotensin Converting Enzyme -2 leading to insulin resistance and henceforth, either new onset diabetes or expression of previously masked diabetes.


SARS-COVID-19
Angiotensin -1
Inhibition
ACE inhibitors
Angiotensin -2
AT-2
ACE2
ARB
AT1 receptor
Bradykinins degradation
Bradykinins levels
BK
B2R
Virus entry
NFkB
Downregulation ACE2 Lysosome degradation
Overexpression TNF-α, IL-6, IL1β
COX2
Chemiotactic signals
Vascular permeability
TNF-α, IL-6, IL1β
Inflammation

Schematic diagram of the potential mechanisms linking the ACE system and COVID-19 infection. The virus could enter directly inside the epithelial cell of the respiratory system via the ACE2 receptor or induce an inflammatory cascade by bradykinin escape related to ACEI therapy. The subsequent increase in prostaglandins and cyclooxygenases leads to interleukin production, which causes cell membrane inflammation potentially leading to apoptosis. Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; AT, angiotensin; B2R, bradykinin 2 receptor; BK, bradykinin; COX, cyclooxygenase.. Source: Gaetano et al. Hypertension prevalence in human coronavirus disease: the role of ACE system in infection spread and severity. International Journal of Infectious diseases. VOLUME 95, P373-375, JUNE 01, 2020

DISCUSSION

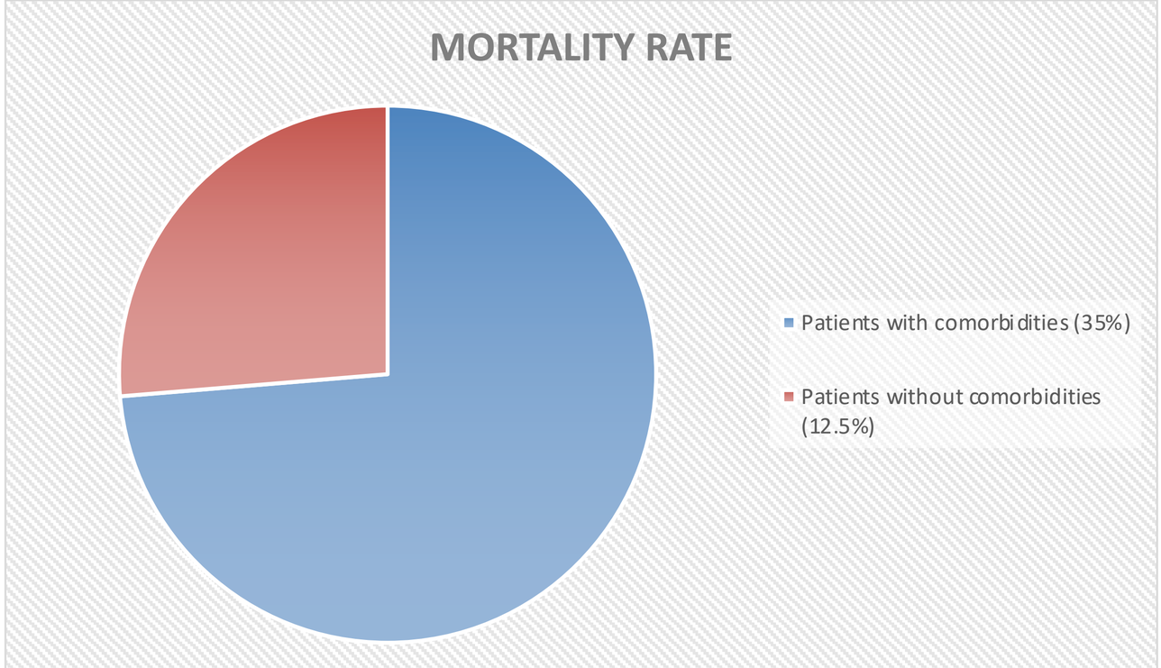
- A total of 124 adults with COVID-19 were included in this study, out of which 103 had comorbidities (83%). Among them 48.5% had GI symptoms.
- Hypertension was the most common comorbidity with prevalence of 57.2% followed by diabetes (40.3%).
- Mortality among patients with GI symptoms was 34% & 14.2%, in patients with and without comorbidities, respectively. Mortality was significantly higher among the patients with both GI symptoms and comorbidities, lowering down the survival rates (P< 0.01).
- The ROC curve analysis showed that ACCI yielded better cut-off for predicting death in COVID-19 with higher area under the ROC, which supports the importance of co-morbidities in the severity of COVID-19.
- During the recent pandemic wave of January 2022, total hospitalized US cases were 4,478,253. Mortality rate was 2.15% (96,654 cases); out of which 12.9% had hypertension and 10.1% had diabetes.
- Our main finding from the study was that GI symptoms in co-morbidities like hypertension, diabetes, cardiovascular disease, chronic pulmonary disease, and cancer are significant risk factors for mortality in patients with COVID-19, after age and sex adjustment.



Patients with comorbidities and without comorbidities: Distribution.

CONCLUSIONS

- ACE-2 receptor, expressed in epithelial cells of several organs including GI tract, is the target for SARS-CoV-2 binding. ACE-2 expression is increased in patients with hypertension, diabetes, and chronic lung disease; henceforth increasing the risk and severity of COVID-19 infection.
- Many studies have identified that co-morbidities can greatly affect the severity of COVID-19. Patients with COVID-19 and co-morbidities are more likely to develop a more severe disease and upwards progression curve.
- Thus, they need all necessary precautions to avoid infection with SARS CoV-2 and should be prioritized for vaccinations.
- Outcomes rates are changing variably with the gain of more knowledge about this disease, increasing vaccinations rates, viral strain mutations and changing transmissibility, and henceforth, improved survival rates were seen in next pandemic waves of this disease during winter of 2020 and again in July 2021.
- COVID-19 patients with GI symptoms and having comorbidities are more likely to develop more severe course and progression of the disease. Further studies are needed to evaluate the outcomes in these group of patients.



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