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Original Article

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Clinical Profile and Outcomes of COVID-19 in Elderly Patients of a Tertiary Care Centre

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Abstract

Objective: To assess the clinical profile, comorbidities, complications, and outcomes of elderly COVID-19 patients admitted to a tertiary care hospital in India. ***Design:*** Descriptive cross-sectional observational study. ***Subjects/Patients:*** 171 elderly patients (≥60 years) with RT-PCR-confirmed COVID-19. ***Methods:*** Patient records were reviewed for demographic details, symptoms, comorbidities, vitals, oxygen requirements, lab findings, complications, and outcomes. Statistical analysis included Chi-square and t-tests ($p<0.05$ considered significant). ***Results:*** Mean age was 71.01 ± 6.66 years; 49.7% were male. Common comorbidities included diabetes (45.6%) and hypertension (32.7%). Fever (79.5%) and cough (50.9%) were the most frequent symptoms. Hypoxia was present in 84.8%, and 25.1% required mechanical ventilation. Pneumonia (78.3%), ARDS (25.1%), and AKI (16.3%) were the main complications. Mortality was 25.1%, highest in those >80 years (58.8%). Hypertension, diabetes, ischemic heart disease, ≥3 comorbidities, and elevated WBC, CRP, LDH, IL-6, ferritin, and HbA1c were significantly associated with mortality. ***Conclusion:*** Elderly COVID-19 patients with comorbidities and elevated inflammatory or metabolic markers face a significantly higher risk of death. Early detection and aggressive management are essential to reduce mortality.

Keywords: ***COVID-19, elderly, comorbidities, mortality, inflammatory markers, India***

Introduction

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1], emerged as a novel zoonotic infection in late 2019 and rapidly escalated into a global pandemic [2-4]. Genetically related to SARS-CoV and MERS-CoV, SARS-CoV-2 is primarily transmitted via human-to-human contact through respiratory droplets and contaminated surfaces. The virus's rapid transmission led the World Health Organization (WHO) to declare it a global pandemic on March 12, 2020 [5-7].

COVID-19 exhibits a wide spectrum of clinical manifestations, ranging from asymptomatic or mild symptoms such as fever, cough, and fatigue [8,9] to severe pneumonia, acute respiratory distress syndrome (ARDS), multi-organ dysfunction, and death. While initially perceived as a respiratory illness, subsequent evidence has revealed that SARS-CoV-2 affects multiple organ systems, including cardiovascular, renal, hepatic, neurological, and hematological systems, especially in vulnerable populations.

Among the most affected groups are the elderly, who are at significantly greater risk of adverse outcomes [10]. Age-related immunosenescence, along with the higher prevalence of chronic illnesses, such as hypertension, diabetes mellitus, ischemic heart disease, chronic kidney disease, and chronic obstructive pulmonary disease, contribute to the severity and complexity of COVID-19 in older adults.

In India, where the elderly population is steadily growing, the COVID-19 pandemic has posed a unique challenge in terms of healthcare resource allocation and outcome prediction in this high-risk group [11]. There remains a need to better understand the clinical course, complications, and prognostic factors specific to the elderly Indian population, to aid timely diagnosis, targeted interventions, and appropriate triaging.

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In this context, the present descriptive cross-sectional observational study was undertaken at a tertiary care hospital in India to identify key factors associated with disease severity and mortality, and to contribute data that may guide clinical decision-making, especially in resource-constrained settings where early identification of high-risk cases is critical.

Methodology and Results

This descriptive cross-sectional observational study was conducted at H.B.T. Medical College and Dr. R.N. Cooper Municipal General Hospital, Mumbai, focusing on patients aged 60 years and above admitted with confirmed COVID-19 infection. Using a convenient sampling method, elderly patients who tested positive via RT-PCR and provided informed consent were included. Data was collected prospectively from case records and clinical sheets, capturing demographics, presenting symptoms, comorbidities, laboratory findings, clinical course, complications, and outcomes (recovery or death). Patients with incomplete records were excluded. Key clinical parameters such as vital signs, oxygen requirement, blood investigations–including CBC, CRP, IL-6, serum ferritin, LDH, and liver and kidney function–were systematically recorded. Radiological assessments and oxygen therapy data were also incorporated. Ethical clearance was obtained prior to the study, and confidentiality and research integrity were maintained throughout.

Data was entered and compiled using Microsoft Excel and analyzed with appropriate statistical tools. Descriptive statistics–such as means, medians, and percentages–were used to summarize the baseline characteristics, clinical features, comorbidities, and complications. Inferential statistics were applied to determine significant associations between variables, including the use of unpaired t-tests for continuous data and Chi-square or Fisher's exact tests for categorical variables. Comparisons were drawn between outcomes (recovery vs. mortality) and factors such as age group, gender, symptomatology, comorbidity profile, and laboratory abnormalities. A p-value of less than 0.05 was considered statistically significant, allowing the study to determine meaningful clinical correlations and risk predictors in elderly patients hospitalized with COVID-19.

In this hospital-based observational study involving 171 elderly COVID-19 patients (aged ≥60 years), the mean age was 71.01 ± 6.66 years, with the majority (53.3%) aged 61-70 years, followed by 36.8% aged 71-80 years, and 9.9% above 80 years. The sex distribution was nearly equal, with 49.7% males and 50.3% females, purposefully matched to avoid gender bias. 81.3% (139 patients) had at least one comorbidity, the most prevalent being diabetes mellitus (45.6%), hypertension (32.7%), ischemic heart disease (16.9%), and COPD (12.9%), with fewer cases having chronic renal failure (4.1%), cerebrovascular accident (2.9%), or cancer (1.7%). Notably, 49.7% of patients had multiple comorbidities, highlighting a high burden of multimorbidity in the elderly population affected by COVID-19 (Table 1).

Table 1: Distribution according to Comorbidities

Comorbidity	N	Percentage (%)
Diabetes Mellitus	78	45.6%
Hypertension	56	32.7%
Ischemic Heart Disease	29	16.9%
COPD	22	12.9%
Chronic Renal Failure	7	4.1%
CVA (Cerebrovascular Accident)	5	2.9%
Cancer	3	1.7%

COPD: Chronic Obstructive Pulmonary Disease, CVA: Cerebrovascular Accident

Amongst the cohort, the most common presenting complaint was fever (79.5%), followed by cough (50.9%), dyspnea (31.6%), chest distress (16.9%), fatigue (14.1%), diarrhea (12.3%), rigor (5.3%), nausea/vomiting (4.1%), and sore throat (2.3%). 106 patients (63%) were normotensive while 60 (35%) were hypertensive, and 5 (1.7%) were hypotensive. Out of 171 patients, 78 patients were diabetic and 68 patients had raised blood sugar on admission. A significant 84.8% of patients were hypoxic (SpO_2 <90%) on room air. In terms of oxygen requirement, 15.2% maintained saturation on room air, 30.1% required nasal prongs, 21.6% needed a Hudson mask, 7% were on BiPAP, and 25.1% needed mechanical ventilation (Table 2).

Table 2: Distribution according to SpO2 levels and O2 requirement

Parameter	Category	N	Percentage (%)
SpO_2 at Room Air	>90%	26	15.2%
	<90%	145	84.8%
	Total	171	100%
Oxygen Requirement	No requirement	26	15.2%
	Nasal prong	53	30.1%
	Hudson mask	37	21.6%
	BiPAP	12	7.0%
	Mechanical ventilation	43	25.1%

The most frequently observed complications were pneumonia (78.3%), ARDS (25.1%), acute kidney injury (16.3%), dyselectrolytemia (15.2%), diabetic ketoacidosis (8.1%), sepsis (7%), acute liver injury (7%), congestive cardiac failure (5.1%), myocardial infarction (1.1%), ischemic stroke (1.1%), septic shock (0.5%), psychosis (0.5%), and anemia (10.5%). Regarding clinical outcomes, 74.9% (128 patients) were discharged, while 25.1% (43 patients) died, reflecting the significant mortality risk in elderly COVID-19 patients with complications.

The laboratory analysis of the 171 elderly COVID-19 patients revealed several key abnormalities. Leukocytosis (WBC counts >11,000/ cu.mm) was present in 80 (46.7%) patients, and a markedly elevated neutrophil-lymphocyte ratio (NLR >3.13) was observed in 158 (92.3%) patients, indicating systemic inflammation. Elevated serum creatinine >1.5 mg/dL was observed in 28 (16.3%) patients, suggesting renal involvement, with 21 of 28 cases having acute kidney injury. Electrolyte disturbances were seen in 15.2% patients, including hyponatremia, hypernatremia, hypokalemia, and hyperkalemia. Liver dysfunction was evident in a small proportion, with 7.1% having hyperbilirubinemia and 5.2% having elevated liver enzymes (AST/ALT). Inflammatory markers were frequently elevated: LDH (>280 U/L) in 82.4%, serum ferritin (>274 ng/mL) in 79.5%, CRP (>5 mg/L) in 82.4%, and IL-6 (>7 pg/mL) in 82.4%, all reflecting significant systemic inflammation and disease severity (Table 3).

Table 3: Distribution according to Lab parameters

Parameter	Category / Range	N	Percentage (%)
WBC Count (/µL)	4000–11000	91	53.2%
	>11000	80	46.7%
NLR Ratio	<3.13	13	7.7%
	>3.13	158	92.3%
Creatinine (mg/dL)	<1.5	143	83.7%
	>1.5	28	16.3%
Dyselectrolytemia	Hyponatremia (	13	7.6%
	Hypernatremia (>145 meq/L)	7	4.9%
	Hypokalemia (	4	1.75%
	Hyperkalemia (>5.2 mmol/L)	2	1.16%
	Total Dyselectrolytemia	26	15.2%
LDH (U/L)	Normal (<280)	29	18.1%
	Raised (>280)	141	82.4%
	Report Not Available	11	6.4%
Ferritin (ng/mL)	<300	14	8.6%
	>300	147	90.7%
	Report Not Available	9	5.2%
CRP (mg/dL)	Normal (<3)	36	21.1%
	Raised (>3)	127	74.3%
	Report Not Available	8	4.6%
IL-6 (pg/mL)	Normal (<5)	42	27.4%
	Raised (>5)	111	72.5%
	Report Not Available	18	10.5%

The comparative analysis in this study revealed several significant associations between clinical factors and outcomes in elderly COVID-19 patients. Increasing age was strongly linked to higher mortality, with 58.8% of patients over 80 years succumbing to the illness compared to only 17% in the 60-70 age group (Table 4). While sex showed no statistically significant impact on outcome, certain symptoms such as dyspnea and chest distress were more common among non-survivors, though overall symptom presentation did not significantly predict mortality. In terms of comorbidities, hypertension (69.7%), diabetes (53.8%), and ischemic heart disease (30.2%) were significantly associated with increased mortality, whereas COPD, CRF, and cancer were not (Table 5). A clear dose-response relationship was noted with multiple comorbidities: mortality rose from 9.2% with one comorbidity to 71.5% in those with more than three (Table 6). Among complications, ARDS, acute kidney injury, myocardial infarction, ischemic stroke, and acute liver injury were significantly associated with death, with ARDS and cardiovascular events showing especially high fatality rates (Table 7). These findings underscore the critical role of age, comorbidity burden, and complication profile in determining outcomes among elderly COVID-19 patients.

Table 4: Comparison of Age and Outcome

Age Group	Total Patients	Discharges (n, %)	Deaths (n, %)	p Value
>80	17	7 (41.2%)	10 (58.8%)	<0.05
71–80	63	46 (73%)	17 (27%)	<0.05
60–70	91	75 (82%)	16 (17%)	<0.05

Table 5: Comparison of Comorbidities with Outcome

Comorbidity	Total Patients (N)	Discharged (n, %)	Deaths (n, %)	p Value
Diabetes Mellitus	78	36 (18.7%)	42 (26.9%)	<0.05
Hypertension	56	26 (20.3%)	30 (69.7%)	<0.05
Ischemic Heart Disease	29	16 (12.5%)	13 (30.2%)	<0.05
COPD	24	16 (12.5%)	6 (13.9%)	>0.05
Chronic Renal Failure	7	5 (3.9%)	2 (4.6%)	>0.05
Cancer	3	2 (1.6%)	1 (2.3%)	>0.05

Table 6: Comparison of Multiple Comorbidity with Outcome

Comorbidity Category	Total Patients (N)	Discharged (n, %)	Deaths (n, %)	p Value
None	32	24 (75%)	8 (25%)	<0.05
Single comorbidity	54	49 (90%)	5 (9.2%)	<0.05
2 comorbidities	46	33 (71.8%)	13 (28%)	<0.05
3 comorbidities	32	15 (46.8%)	17 (53.1%)	<0.05
More than 3 comorbidities	7	2 (28.5%)	5 (71.5%)	<0.05

Table 7: Comparison of Complications with Outcome

Complication	Total Patients (N)	Discharged (n)	Deaths (n)	Death Rate (%)	p Value
ARDS	43	0	43	100%	<0.05
Pneumonia	134	110	24	17.9%	>0.05
Acute Kidney Injury	21	7	14	66.6%	<0.05
Dyselectrolytemia	26	20	6	23%	>0.05
Myocardial Infarction	2	0	2	100%	<0.05
Congestive Cardiac Failure	9	6	3	33.3%	>0.05
Ischaemic Stroke	2	0	2	100%	<0.05
Diabetic Ketoacidosis	14	13	1	7.6%	>0.05
Sepsis	13	9	4	33.3%	>0.05
Anaemia	18	17	1	5.8%	>0.05

The study demonstrated a strong association between several laboratory parameters and mortality among elderly COVID-19 patients. Total leukocyte count (TLC) was significantly elevated in non-survivors, with a mean WBC count of 13.8 ± 1.57 $\times 10^3/\mu L$ in those who died compared to 8.48 ± 1.84 $\times 10^3/\mu L$ in survivors. Neutrophil percentage was higher in deaths (85.19%) than in discharges (74.84%), while lymphocyte percentage was lower (12.44% vs. 18.89%), all with statistically significant p-values. Although neutrophil-lymphocyte ratio (NLR) was elevated (>3) in over 79% of deaths and 81% of discharges, it was not statistically associated with outcome. In contrast, HbA1c levels were significantly linked to mortality: 46.6% of deaths had HbA1c >6.4% compared to only 14.1% of discharges, indicating poor glycemic control as a strong predictor of outcome. Multivariate analysis confirmed that TLC (OR = 3.88; 95% CI: 2.25-4.53; $p < 0.05$), D-dimer (OR = 1.52; 95% CI: 1.14-3.62; $p < 0.05$), serum ferritin (OR = 2.70; 95% CI: 2.33-3.13; $p < 0.05$), CRP (OR = 2.16; 95% CI: 1.58-2.93; $p < 0.05$), and HbA1c >6.4% (OR = 1.29; 95% CI: 1.03-1.62; $p < 0.05$) were significant independent predictors of mortality, while platelet count and LDH did not show a statistically significant association (Table 8).

Table 8: Association of laboratory parameters with Mortality

Parameter	Odds Ratio (OR)	95% Confidence Interval	p Value
Total Leukocyte Count	3.88	2.25 – 4.53	<0.05
Platelet Count	1.17	0.45 – 2.85	>0.05
LDH	0.95	0.32 – 2.97	>0.05
D-dimer	1.52	1.14 – 3.62	<0.05
Serum Ferritin	2.70	2.33 – 3.13	<0.05
CRP	2.16	1.58 – 2.93	<0.05
HbA1c	1.29	1.03 – 1.62	<0.05

Discussion

This study evaluated elderly COVID-19 patients, most of whom were aged 61-70 years (53.3%), with a mean age of 71.01 ± 6.66 years and an equal sex distribution, thereby ensuring unbiased analysis. These findings are in agreement with studies by Jain SK *et al* [12], who reported a slightly younger cohort (mean age 53.5 years) with a male predominance, Li P *et al* [13], who observed a median age of 68 years with near-equal gender distribution, and D'Ascanio M *et al* [14], whose cohort had a higher median age of 79.7 years and a slight female predominance. The common presenting symptoms were fever (79.5%), cough (50.9%), and dyspnea (31.6%), closely mirroring the findings of Li P *et al*.[13], highlighting the predominance of respiratory symptoms in elderly COVID-19 patients. In the present study, 67.3% of patients presented within 7 days of symptom onset, reflecting relatively early healthcare-seeking behaviour. In contrast, Li P *et al* reported a median delay of 10 days (IQR: 7-14) between symptom onset and admission, with similar timelines noted for specific symptoms such as fever, cough, dyspnea, and gastrointestinal complaints [13]. This difference may reflect regional variations in healthcare access, disease awareness, or illness severity at presentation. A high comorbidity burden was evident, particularly diabetes (45.6%), hypertension (32.7%), and ischemic heart disease (16.9%), with nearly half (49.7%) having multiple coexisting conditions. These patterns align with the study by Li P [13], all of which report significantly higher mortality with increasing comorbidity burden. Notably, 39.7% of patients were hyperglycemic on admission, suggesting underlying metabolic stress or undiagnosed diabetes, both of which are recognized risk factors for adverse outcomes. Jain SK *et al* [12] similarly noted low oxygen saturations at presentation and high ventilatory needs in non-survivors.

A broad spectrum of hematological and biochemical parameters was assessed to understand their prognostic significance. On admission, 46.7% had leukocytosis, while 53.2% had normal WBC counts, similar to findings by D'Ascanio M *et al*, who observed normal baseline hematologic indices in elderly patients [14]. Despite this, the neutrophil-lymphocyte ratio (NLR) was elevated (>3.13) in 92.3% of patients, suggesting a robust inflammatory response. This aligns with D'Ascanio *et al*, who reported significantly higher NLR and CRP values in the very elderly, highlighting their role as markers of poor prognosis [14]. Serum creatinine was elevated in 16.3%, indicating renal impairment, comparable to Li P *et al*, who observed multiple organ dysfunction and elevated procalcitonin in severely ill elderly patients [13]. Electrolyte imbalances were also present in 15.2%, most commonly hyponatremia (13%), along with smaller proportions of hypernatremia, hypokalemia, and hyperkalemia.

Mild hepatic dysfunction was seen, with 7.1% having hyperbilirubinemia and 5.2% elevated AST. Systemic inflammation was evident through raised LDH (82.4%), serum ferritin (90.7%), CRP (74.3%), and IL-6 (72.5%), all of which were significantly associated with adverse outcomes. These observations are in concordance with Li P *et al*, who identified elevated inflammatory

markers as key predictors of severity and mortality [13]. Complication rates were high, with pneumonia (78.3%), ARDS (25.1%), and acute kidney injury (16.3%) being the most common. Other complications included dyselectrolytemia (15.2%), diabetic ketoacidosis (8.1%), acute liver injury (7%), and sepsis (7%), while myocardial infarction, ischemic stroke, and septic shock were less frequent but associated with high fatality. These findings mirror those of Li P *et al*, who reported respiratory failure, sepsis, and cardiovascular complications as leading causes of clinical deterioration in older COVID-19 patients [13]. Together, these results affirm that systemic inflammation, multi-organ involvement, and metabolic dysregulation significantly contribute to mortality in this vulnerable population.

In this study, 74.9% of patients were discharged, while 25.1% died, a lower mortality rate compared to Jain SK *et al* [12] (40.9%) and Li P *et al* [13], who reported higher fatality in elderly cohorts. Mortality increased with age-58.8% in patients >80 years, 27% in 71-80, and 17% in 60-70 years ($p < 0.05$)-a trend supported by Jain SK *et al*, who observed higher mean age in non-survivors [12], and by Li P *et al*, who reported a 5.3-fold increase in mortality risk in those over 70, with a 1.55-fold rise for every 5-year age increment [13]. While mortality was slightly higher in males (53.5%), the difference was not statistically significant, in line with Li P *et al* [13]. No presenting symptom independently predicted mortality, however, diabetes, hypertension, and ischemic heart disease were significantly associated with death ($p < 0.05$), especially in patients with ≥3 comorbidities. This mirrors findings from Jain SK *et al* [12], who linked multiple comorbidities with poor outcomes, and Li P *et al*, who observed higher mortality with cardiovascular disease (OR 1.8) and hypertension (OR 2.3) [13]. Although Li P *et al* found no significant association of cancer or diabetes alone with mortality, the cumulative burden remained a key determinant [13]. Dai SP *et al* similarly reported high rates of chronic illness in elderly patients, such as cardiovascular disease (56.5%), hypertension (43.5%), and chronic pulmonary disease (21.7%), emphasizing their vulnerability[15].

Mortality was also significantly higher in patients who developed ARDS, acute kidney injury, myocardial infarction, stroke, or acute liver injury, consistent with Jain SK *et al*, who found complications like ARDS, sepsis, MI, and renal or cerebrovascular events more common in non-survivors [12]. The heightened risk of ARDS in the elderly may be explained by age-related immune alterations [16], including exaggerated pro-inflammatory responses, reduced type I interferon activity, and impaired T- and B-cell function-factors contributing to prolonged inflammation and impaired viral clearance [17,18]. Several laboratory markers were also associated with mortality: TLC and neutrophil counts were higher, and lymphocytes lower in non-survivors ($p < 0.05$). Although NLR >3.13 was common, it did not correlate with mortality in this study, differing from Jain SK *et al*, who reported it as predictive [12]. In contrast, HbA1c >6.4% was significantly more prevalent among non-survivors (46.6% vs. 14.1%; $p < 0.05$), underscoring the prognostic role of glycemic control. Elevated LDH (86%), ferritin (81.4%), CRP, and IL-6 also correlated with death. These results are consistent with those of Li P *et al*, who identified leukocytosis, neutrophilia, elevated D-dimer, and cardiac markers as predictors [13], and with D'Ascanio M *et al*, who highlighted age, comorbidities, and inflammatory markers as independent mortality risks [14].

To conclude, advanced age and comorbidities, particularly diabetes and hypertension, emerged as major risk factors for mortality in elderly COVID-19 patients. Early testing, prompt hospitalization, and assessment of inflammatory markers like CRP, D-dimer, and ferritin are critical for risk stratification. Careful monitoring is especially needed for diabetic patients and for thrombotic complications. Public awareness and timely medical attention remain essential to reduce COVID-19-related deaths.

Abbreviations

COVID-19: Coronavirus Disease 2019
SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2
SARS-CoV: Severe Acute Respiratory Syndrome Coronavirus
MERS-CoV: Middle East Respiratory Syndrome Coronavirus
ARDS: Acute Respiratory Distress Syndrome
CRP: C-Reactive Protein
LDH: Lactate Dehydrogenase
NLR: Neutrophil-to-Lymphocyte Ratio
IL-6: Interleukin-6
WBC: White Blood Cell
TLC: Total Leukocyte Count
MI: Myocardial Infarction
COPD: Chronic Obstructive Pulmonary Disease
CVA: Cerebrovascular Accident
CBC: Complete Blood Count
AST: Aspartate Aminotransferase
ALT: Alanine Aminotransferase
RT-PCR: Reverse Transcriptase-Polymerase Chain Reaction
CI: Confidence Interval
OR: Odds Ratio
IQR: Interquartile Range
WHO: World Health Organization
O_2: Oxygen (Used clinically to denote oxygen saturation or therapy)

Disclosures

Ethical approval and consent to participate:

The study was approved by the Institutional Ethics Committee of H.B.T. Medical College and Dr. R.N. Cooper Municipal General Hospital, Mumbai, Maharashtra, India. Written informed consent was obtained from all participants included in the study.

Consent for publication

Consent for publication was obtained from the participants prior to data collection and analysis.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Dr. Neelam Redkar, Dr. Ganesh Karambelkar, Dr Prakash Relwani and Dr Suyash Vanarase conceptualized the study and oversaw data collection and clinical coordination. Dr. Neelam Redkar and Dr. Ganesh Karambelkar were the principal investigators. Dr. Ganesh Karambelkar also assisted with data interpretation and literature

review. Vineet Chandak contributed to manuscript writing. Dr. Alhad Mulkalwar provided critical review and guidance in manuscript preparation. All authors have read and approved the final manuscript.

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