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Favipiravir for COVID-19 Pneumonia: Effectiveness, Safety, and Clinical Outcomes: A Retrospective Single-Center Experience

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Abstract: Background: Coronaviruses, including SARS-CoV-2, cause a range of respiratory and gastrointestinal illnesses, with COVID-19 becoming a global pandemic in 2020. Favipiravir, an antiviral drug, has shown promising results in reducing disease progression and improving recovery in COVID-19 patients. Methodology: This retrospective cohort study evaluated the efficacy, safety, and clinical outcomes of favipiravir in COVID-19 pneumonia patients admitted to the AFHSR. The analysis included patient characteristics, treatment responses, and laboratory parameters. Data were cleaned using Excel and analyzed with IBM SPSS version 29.0.0. Results: Our study included 297 COVID-19 pneumonia patients treated with favipiravir, with 129 (43.4%) females and 165 (55.6%) males with a mean age of 61.47 years. Comorbidities were present in 223 patients (75.1%), most commonly diabetes (N = 78, 33.6%) and hypertension (N = 72, 31.0%). Common symptoms were shortness of breath (N = 92, 31.0%), a cough (N = 86, 29.0%), and fever (N = 69, 23.3%). Complications occurred in 53 patients (17.8%), with acute kidney injury in 15 patients (5.1%). The overall mortality was 62 (20.9%), higher in those with comorbidities (75.7%, $p = 0.017$). Kaplan–Meier analysis showed worse survival for patients with comorbidities ($p = 0.049$) and smokers ($p = 0.042$). Elevated WBCs, LDH, AST, and CRP were linked to better survival ($p < 0.05$). Non-survivors had more severe respiratory impairment (FiO_2, $p = 0.035$). Conclusions: Our study suggests favipiravir may help reduce ICU admissions and mortality in COVID-19 pneumonia patients, but outcomes are significantly influenced by age, comorbidities, and complications. This highlights the need for individualized treatment strategies. Further randomized controlled trials are essential to define favipiravir's role in COVID-19 management.

Keywords: COVID-19; mortality; favipiravir; pneumonia; SARS; safety; effectiveness

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1. Introduction

Coronaviruses are a family of viruses responsible for a range of illnesses, from moderate to severe, including Middle East Respiratory Syndrome (MERS) and severe acute

respiratory syndrome (SARS). They commonly cause infections in the respiratory and gastrointestinal tracts. These positive-strand RNA viruses are classified into four major genera: Alphacoronavirus, Betacoronavirus, Gammacoronavirus, and Deltacoronavirus [1,2]. In March 2020, Saudi Arabia confirmed its first COVID-19 case in an adult Saudi national. In response, the Ministry of Health swiftly implemented measures to control the outbreak, designating over 25 hospitals with 8800 total beds, including 8000 ICU beds and 2200 isolation beds, to treat and manage suspected and confirmed cases during the pandemic [3,4]. Most COVID-19 patients experience mild symptoms, but the disease can worsen, particularly in the elderly or those with underlying conditions like chronic lung or cardiovascular disease. Common symptoms include fever, a cough, muscle pain, and gastrointestinal issues. While most cases remain mild, about 25% progress to more severe illness, with some developing acute respiratory distress syndrome (ARDS) and approximately 5% reaching a critical condition. Various treatments are under investigation, including chloroquine, hydroxychloroquine, favipiravir, monoclonal antibodies, antisense RNA, corticosteroids, convalescent plasma, and vaccines [5,6].

Favipiravir (Avigan) is an antiviral drug that inhibits viral RNA-dependent RNA polymerase, a key enzyme in viral replication. Initial in vitro studies demonstrated its inhibitory effects against SARS-CoV-2. Clinical studies show favipiravir is more effective than Lopinavir/Ritonavir in reducing disease progression and the viral load in COVID-19 patients. In a trial comparing favipiravir to arbidol, the favipiravir group had a significantly higher clinical recovery rate by day 7 and a faster reduction in fever and coughing in moderate cases, including those with hypertension and diabetes. An Indian phase 3 trial confirmed faster recovery and high tolerability with favipiravir in mild-to-moderate COVID-19 patients, and a meta-analysis showed improved viral clearance and reduced hospitalization. Common side effects include diarrhea, nausea, vomiting, chest pain, and elevated liver enzymes [7–9]. Few studies have explored the use of favipiravir for COVID-19 management in Saudi Arabia. Therefore, we conducted this retrospective cohort study to evaluate the effectiveness, safety, and clinical outcomes of favipiravir in COVID-19 pneumonia patients admitted to the Armed Forces Hospitals Southern Region (AFHSR).

2. Materials and Methods

Our study examined COVID-19 patients admitted to the Armed Forces Hospitals Southern Region (AFHSR), Saudi Arabia, between January 2020 and January 2023, all of whom were over 18 years of age. We employed a retrospective, non-interventional approach to gather data, using a standardized data extraction form to collect key demographic, clinical, and laboratory information. This included details on patient age, gender, and pre-existing comorbidities such as diabetes and cardiovascular disease. Additionally, we closely examined the medications administered and the laboratory profiles, including inflammatory markers and organ function tests. Our primary focus was to assess the effectiveness and safety of favipiravir, and to evaluate clinical outcomes such as the length of the hospital stay, readmission rates, and the overall mortality. All data were meticulously organized and analyzed to provide a comprehensive understanding of patient outcomes. The study received full approval from the Institutional Review Board at the AFHSR, ensuring compliance with ethical research standards.

A comprehensive statistical analysis was conducted on the dataset, encompassing both descriptive and inferential methodologies. A descriptive analysis was conducted to summarize the demographic characteristics of the participants, which included the age, gender, and other features. Moreover, the Chi-Square Test and Fisher's Exact Test were used to determine the association between categorical variables. The Independent Sample T Test was used to determine the association and difference between continuous variables. Subsequently, Kaplan–Meier Survival Analysis was used to find the survival rate in favipiravir users based on different parameters. All statistical analyses were executed using IBM's SPSS software, version 29.0.0.

3. Results

Our study included 297 COVID-19 pneumonia patients treated with favipiravir, of which 129 (43.4%) were female. The mean age was 61.47 years (SD = 16.8), with an age range of 23 to 106 years, and the mean BMI was 31.15 kg/m^2 (SD = 7.4), ranging from 20.7 to 56.0. The majority of patients, 277 (93.3%), had no history of smoking. Comorbidities were present in 223 patients (75.1%), while 73 (24.6%) had none. Regarding non-COVID-19 medications, 137 patients (46.1%) were on antidiabetics, and 77 (25.9%) were on anticoagulants. The mean duration of favipiravir use was 8.3 days (SD = 21.6). Common antibiotics included macrolides, used in 129 patients (43.4%), and cephalosporins in 104 patients (35.0%). Corticosteroids were frequently administered, with long-acting variants given to 224 patients (75.4%) and short-acting variants to 11 patients (3.7%) (Table 1). The most common comorbidities were diabetes mellitus (33.6%) and hypertension (31.0%), followed by ischemic heart disease or acute coronary syndrome (8.3%) and chronic kidney disease (3.5%), with less frequent comorbidities shown in Figure 1. The most commonly reported symptom was shortness of breath (31.0%), followed by a cough (29.0%) and fever (23.3%). Less frequent symptoms included fatigue (3.8%), vomiting or diarrhea (3.0%), chest pain (2.1%), and abdominal pain (1.6%), with 6.2% of patients experiencing other unspecified symptoms (Figure 2).

Table 1. Sociodemographic and other parameters of COVID-19 pneumonia patients who used favipiravir (n = 297).

		Frequency, N (%)
Gender	Female	129 (43.4%)
	Male	165 (55.6%)
Age	Mean (SD)	61.47 (16.8)
	Range	23–106
BMI (Kg/m^2)	Mean (SD)	31.15 (7.4)
	Range	20.7–56.0
Smoking History	No	277 (93.3%)
	Yes	6 (2.0%)
Comorbidities	No	73 (24.6%)
	Yes	223 (75.1%)
Non-COVID-19-related	ACEI/ARB	23 (7.7%)
	Anticoagulants	77 (25.9%)
	Antidiabetics	137 (46.1%)
	Antiplatelets	2 (0.7%)
	Betablockers	11 (3.7%)
	CCB	7 (2.4%)
	Diuretics	4 (1.3%)
	Statins	14 (4.7%)
	Thyroxin Drugs	2 (0.7%)
Days of Favipiravir Use	Mean (SD)	8.3 (21.6)

Table 1. *Cont.*

		Frequency, N (%)
Antibiotics	Carbapenems	16 (5.4%)
	Cephalosporin	104 (35.0%)
	Fluoroquinolones	22 (7.4%)
	Macrolides	129 (43.4%)
	Penicillins	3 (1.0%)
	Tetracyclines	13 (4.4%)
Corticosteroids	Long-acting	224 (75.4%)
	Short-acting	11 (3.7%)

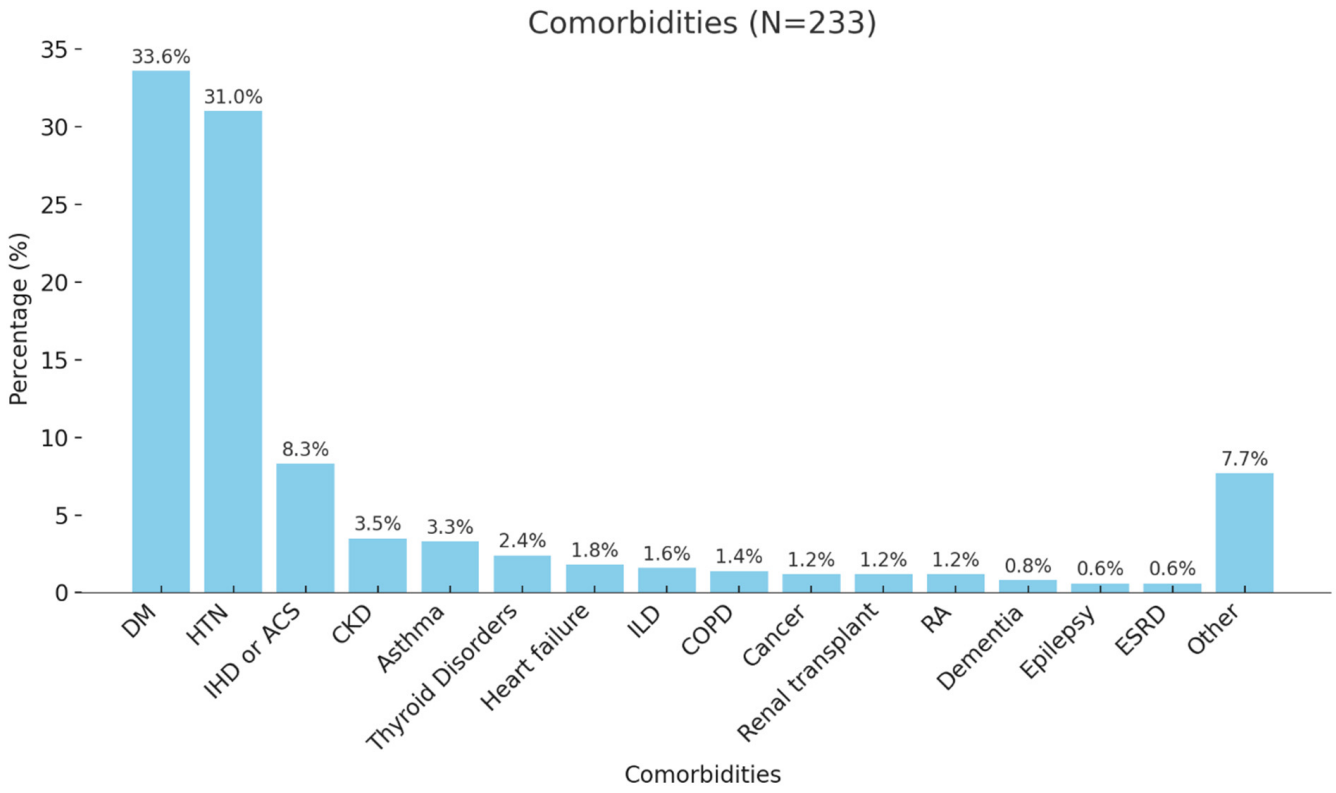

Figure 1. Different comorbidities among participants (n = 233).

Table 2 presents the laboratory parameters for 297 COVID-19 pneumonia patients treated with favipiravir. The mean hemoglobin (Hb) level was 14.29 g/dL, ranging from 7.5 to 112.0 g/dL. The mean white blood cell (WBC) count was 6.51 $\times$ 10^9/L, and the platelet count averaged 219.96 $\times$ 10^9/L. The erythrocyte sedimentation rate (ESR) was elevated at 70.31 mm/h. Liver function tests indicated a mean ALT of 32.58 U/L and AST of 42.89 U/L. Renal function tests showed a mean creatinine level of 100.16 µmol/L and urea at 7.32 mmol/L. The average sodium and potassium levels were 133.57 mmol/L and 4.21 mmol/L, respectively. Inflammatory markers such as D-Dimer (3.18 mg/L), ferritin (439.41 ng/mL), and CRP (72.11 mg/L) were elevated. Other notable values included LDH at 302.63 U/L and FiO_2 at 80.25%.

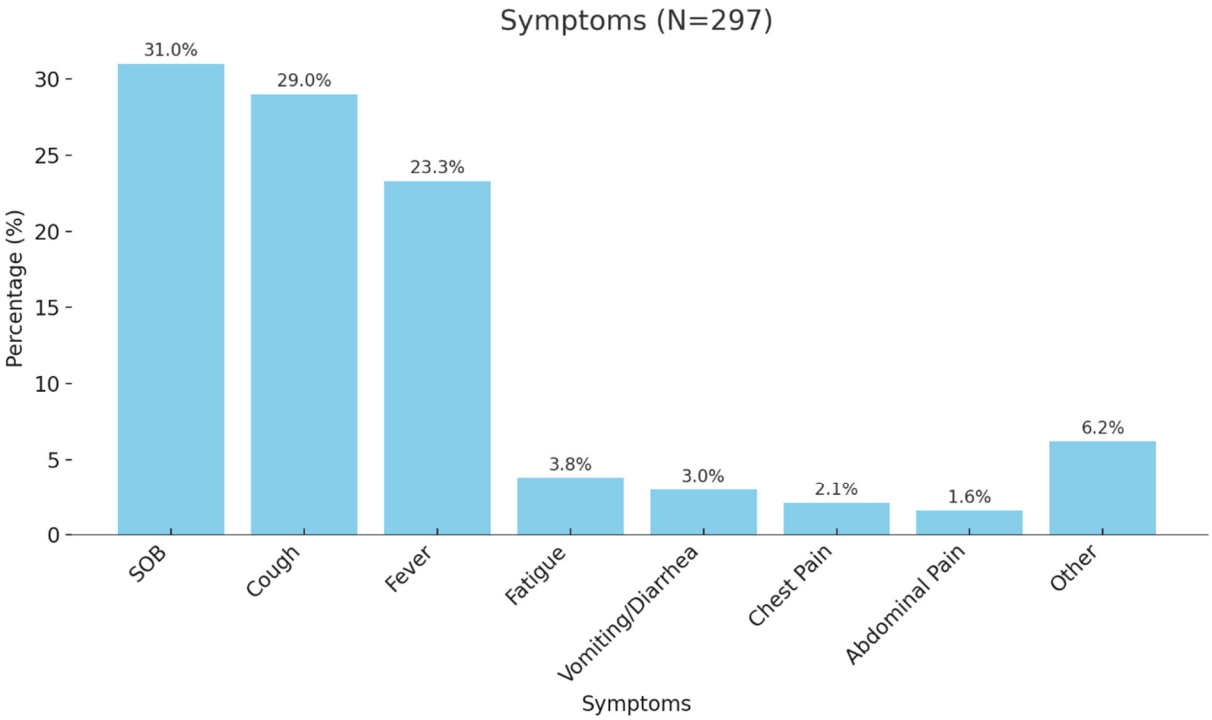

Figure 2. Presenting symptoms among COVID-19 pneumonia patients (n = 297).

Table 2. Different lab-related parameters of COVID-19 pneumonia patients who used favipiravir (n = 297).

	Mean (SD)	Range (Min–Max)
CBC		
Hemoglobin (Hb) (g/dL)	14.29 (6.17)	7.50–112.00
White blood cell (WBC) count (10^9/L)	6.51 (3.37)	1.90–22.78
Platelet count (10^9/L)	219.96 (82.67)	52.00–656.00
Erythrocyte sedimentation rate (ESR) (mm/h)	70.31 (29.86)	6.00–120.00
LFTs		
Alanine aminotransferase (ALT) (U/L)	32.58 (22.82)	6.00–160.00
Aspartate aminotransferase (AST) (U/L)	42.89 (25.49)	13.00–204.00
Alkaline phosphatase(ALP) (U/L)	70.42 (35.08)	28.0–263.0
Gamma-glutamyl transferase (GGT) (U/L)	51.29 (59.36)	8.0–516.0
Total bilirubin (µmol/L)	14.46 (18.20)	0.4–292.3
Direct bilirubin (µmol/L)	4.44 (10.41)	0.1–170.1
RFTs		
Creatinine (µmol/L)	100.16 (63.26)	37–581
Urea (mmol/L)	7.32 (5.06)	2–36
Serum Profile		
Sodium (mmol/L)	133.57 (4.67)	116.00–161.00

Table 2. *Cont.*

	Mean (SD)	Range (Min–Max)
Potassium (mmol/L)	4.21 (0.58)	3–7
Corrected calcium (mmol/L)	3.11 (13.96)	1.89–232
Phosphorus (mmol/L)	1.22 (3.20)	0.49–53
Magnesium (mmol/L)	0.78 (0.10)	0.52–1.26
Other		
D-Dimer (mg/L)	3.18 (27.42)	0.19–455.00
Ferritin (ng/mL)	439.41 (598.67)	6.90–4454.00
C-reactive protein (CRP)(mg/L)	72.11 (55.62)	5.0–345.2
Lactic acid dehydrogenase (LDH)(U/L)	302.63 (137.85)	98.00–1411.00
FiO_2	80.25 (18.66)	0–100
Hematocrit (%)	42.82 (6.17)	23.2–59.5
Temperature (°C)	38.75 (21.05)	23.9–373.0
Heart rate	96.46 (17.35)	54.0–196.0
Respiratory rate	20.51 (1.45)	17.0–28.0
Mean arterial pressure (MAP)	88.50 (11.05)	64.0–118.0

Table 3 shows the effectiveness, safety, and clinical outcomes for 297 COVID-19 pneumonia patients treated with favipiravir. Blood cultures were negative in 200 patients (67.3%) and positive in 26 (8.8%), with Staphylococcus being the most common pathogen (4.4%). Urine cultures were negative in 168 (56.6%) and positive in 15 (5.1%). Sputum and tracheal cultures were positive in eight (2.7%) and nine (3.0%) patients, respectively. Most patients (78.1%) did not have a CT scan, and the most common abnormal finding was consolidation (9.1%). The mean hospital stay was 6.17 days, and the mean ICU stay was 22 days. Intubation was required in 65 patients (21.9%), while 40 patients (13.5%) developed ARDS. Complications were present in 53 patients (17.8%), with acute kidney injury (AKI) in 5.1% and pulmonary embolism in 3.0%. Overall, 62 patients (20.9%) died, and 96 (32.3%) were readmitted within 15 days.

Table 3. Effectiveness, safety, and clinical outcome for COVID-19 pneumonia patients who used favipiravir (n = 297).

		Frequency N (%)
Microbiology and Imaging		
Blood Culture	Negative	200 (67.3%)
	Positive	26 (8.8%)
	Common Pathogen Class (Staphylococcus)	13 (4.4%)
Urine Culture	Negative	168 (56.6%)
	Positive	15 (5.1%)
	Commonly Mixed Growth	5 (1.5%)

Table 3. *Cont.*

		Frequency N (%)
Sputum Culture	Negative	112 (37.7%)
	Positive (WBCs and Mixed Bacteria)	8 (2.7%)
Tracheal Culture	Negative	84 (28.3%)
	Positive (WBCs and Mixed Bacteria)	9 (3.0%)
CT Findings	No CT Performed	232 (78.1%)
	Normal	10 (3.4%)
	Consolidation	27 (9.1%)
	Ground Glass	15 (5.1%)
	Pleural Effusion	6 (2.0%)
	Other	4 (1.3%)
Length of Stay		
Length of Hospital Stay (Days)	Mean (SD)	6.17 (4.89)
	Range	1–20
Length of ICU Stay (Days)	Mean (SD)	22.00 (37.52)
	Range	3–89
Outcome and Complications		
Needed Intubation	No	220 (74.1%)
	Yes	65 (21.9%)
Acute respiratory distress syndrome (ARDS)	No	241 (81.1%)
	Yes	40 (13.5%)
Complication	No Complications	244 (82.2%)
	ACS	3 (1.0%)
	AKI	15 (5.1%)
	ARDS	4 (1.3%)
	Cardiac Arrest	8 (2.7%)
	CVA	9 (3.0%)
	Liver Failure/Heart Failure	5 (1.7%)
	Pulmonary Embolism (PE)	9 (3.0%)
Survival	Dead	62 (20.9%)
	Alive	232 (78.1%)
Readmission	Within 15 Days	96 (32.3%)
	Within 30 Days	9 (3.0%)
	Within 60 Days	14 (4.7%)
	Within 90 Days	4 (1.3%)

The association between the overall survival and mortality and various sociodemographic and clinical parameters showed that gender was not significantly associated with survival ($p = 0.374$), but age was a strong predictor, with those who died being younger on average (58.87 years vs. 70.82 years, $p < 0.001$). Comorbidities were linked to higher mortality ($p = 0.017$), with 75.7% of those with comorbidities dying. Complications were highly significant ($p < 0.001$), as 41.5% of patients with complications died. Positive sputum ($p = 0.006$) and tracheal cultures ($p < 0.001$) were associated with higher survival. Early readmission was significantly linked to mortality, particularly within 15 days ($p = 0.028$). Interestingly, survivors had higher white blood cell (WBC) counts (7.91 vs. 6.15, $p < 0.001$) and higher lactic acid dehydrogenase (LDH) levels (346.30 vs. 291.10, $p = 0.007$). Additionally, survivors had elevated aspartate aminotransferase (AST) levels (50.49 vs. 40.91, $p = 0.010$), creatinine (114.28 vs. 96.45, $p = 0.052$), and urea levels (8.85 vs. 6.93, $p = 0.009$). Markers like C-reactive protein (CRP) were higher in survivors (88.50 vs. 67.77, $p = 0.011$), and GGT (72.58 vs. 45.85, $p = 0.002$) also showed significant differences. Non-survivors required higher FiO_2 (83.35 vs. 73.80, $p = 0.035$), indicating more severe respiratory impairment. Other parameters like hemoglobin, the platelet count, and bilirubin levels did not show significant differences (Table 4).

Table 4. Association between overall survival/mortality and different sociodemographic and other parameters of participants.

		Overall Outcome/Survival		Sig. Value
		Dead, N (%)	**Alive, N (%)**	
Gender	Female	24 (18.8%)	104 (81.3%)	0.374 [a]
	Male	38 (23.0%)	127 (77.0%)	
Age (Year)	Mean (SD)	70.82 (16.62)	58.87 (16.02)	<0.001 [c]
BMI (Kg/m^2)	Mean (SD)	29.38 (9.08)	31.60 (7.15)	0.273 [c]
Smoking	No	56 (20.3%)	220 (79.7%)	0.108 [b]
	Yes	3 (50.0%)	3 (50.0%)	
Comorbidities	No	8 (11.1%)	64 (88.9%)	0.017 [a]
	Yes	54 (24.3%)	168 (75.7%)	
Complications	No	31 (12.9%)	210 (87.1%)	<0.001 [a]
	Yes	31 (58.5%)	22 (41.5%)	
Blood Culture	Negative	45 (22.5%)	155 (77.5%)	0.173 [a]
	Positive	9 (34.6%)	17 (65.4%)	
Urine Culture	Negative	41 (24.4%)	127 (75.6%)	0.534 [a]
	Positive	5 (33.3%)	10 (66.7%)	
Sputum Culture	Negative	18 (16.1%)	94 (83.9%)	0.006 [b]
	Positive	5 (62.5%)	3 (37.5%)	
Tracheal Culture	Negative	16 (19.0%)	68 (81.0%)	<0.001 [b]
	Positive	8 (88.9%)	1 (11.1%)	
Readmission	Within 15 Days	2 (2.1%)	94 (97.9%)	0.028 [b]
	Within 30 Days	1 (11.1%)	8 (88.9%)	

Table 4. *Cont.*

		Overall Outcome/Survival		Sig. Value
		Dead, N (%)	**Alive, N (%)**	
	Within 60 Days	2 (14.3%)	12 (85.7%)	
	Within 90 Days	1 (25.0%)	3 (75.0%)	
		Alive, Mean (SD)	**Dead, Mean (SD)**	
Length of Hospital Stay (Days)		9.33 (9.7)	5.0 (3.3)	0.182
Length of ICU Stay (Days)		3.0 (-)	5.50 (3.5)	0.333
Laboratory Parameters				
Hemoglobin (Hb) (g/dl)		13.40 (2.18)	14.53 (6.83)	0.207
White Blood Cells (WBCs) (10^9/L)		7.91 (4.10)	6.15 (3.05)	<0.001
Platelets (10^9/L)		226.23 (77.03)	218.29 (84.19)	0.506
Erythrocyte Sedimentation Rate (ESR) (mmh/h)		76.19 (31.68)	68.91 (29.36)	0.217
D-Dimer (mg/L)		3.18 (7.53)	3.18 (30.45)	0.999
Lactic Acid Dehydrogenase (LDH) (U/L)		346.30 (203.06)	291.10 (112.51)	0.007
Aspartate Aminotransferase (AST) (U/L)		50.49 (36.16)	40.91 (21.55)	0.010
Creatinine (µmol/L)		114.28 (72.36)	96.45 (60.27)	0.052
Urea (mmol/L)		8.85 (5.46)	6.93 (4.88)	0.009
C-Reactive Protein (CRP) (mg/l)		88.50 (60.19)	67.77 (53.66)	0.011
Alkaline Phosphatase (ALP) (U/L)		86.93 (48.87)	66.13 (29.15)	<0.001
Gamma-Glutamyl Transferase (GGT) (U/L)		72.58 (102.13)	45.85 (40.64)	0.002
Total Bilirubin (µmol/L)		13.44 (7.43)	14.73 (20.10)	0.628
FiO_2		73.80 (20.50)	83.35 (17.06)	0.035
Vital Parameters				
Temperature, "°C"		37.29 (0.78)	39.04 (23.06)	0.620
Heart Rate		98.49 (17.22)	96.04 (17.38)	0.400
Respiratory Rate		20.39 (1.64)	20.53 (1.42)	0.572
Mean Arterial Pressure (MAP)		85.67 (10.36)	88.90 (11.14)	0.346

[a] Chi-Square Test, [b] Fisher's Exact Test, [c] Independent T Test.

The Kaplan–Meier analysis compared the survival of COVID-19 pneumonia patients treated with favipiravir based on gender, comorbidities, and smoking history (Figures 3–5). Gender analysis showed no significant difference in survival ($p = 0.393$), although males had a longer mean survival time (158 days) compared to females (28 days). Comorbidity analysis revealed a significant impact on survival ($p = 0.049$); patients without comorbidities had a much higher mean survival time (313 days) than those with comorbidities (24 days). Smoking history also plays a significant role ($p = 0.042$); non-smokers had a mean survival time of 178 days, while smokers had just 11 days. These findings suggest that comorbidities and smoking significantly worsen survival outcomes, while gender differences in survival are not statistically significant.

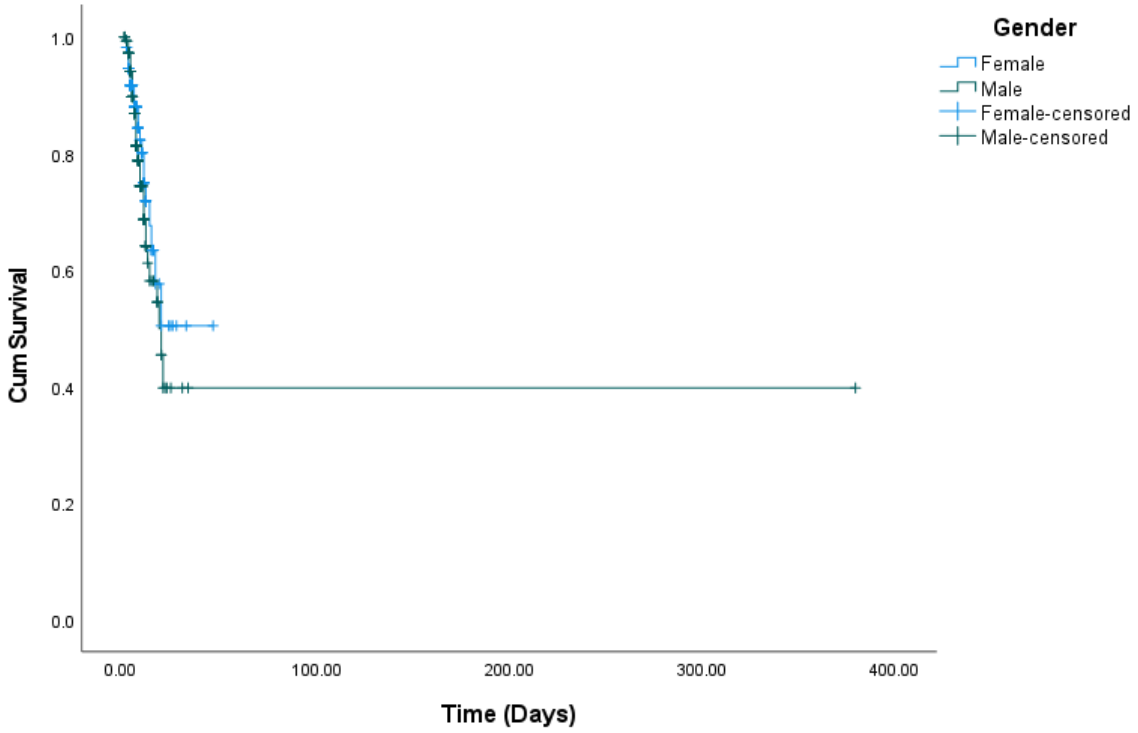

Figure 3. Survival of COVID-19 pneumonia patients with favipiravir usage based on gender difference.

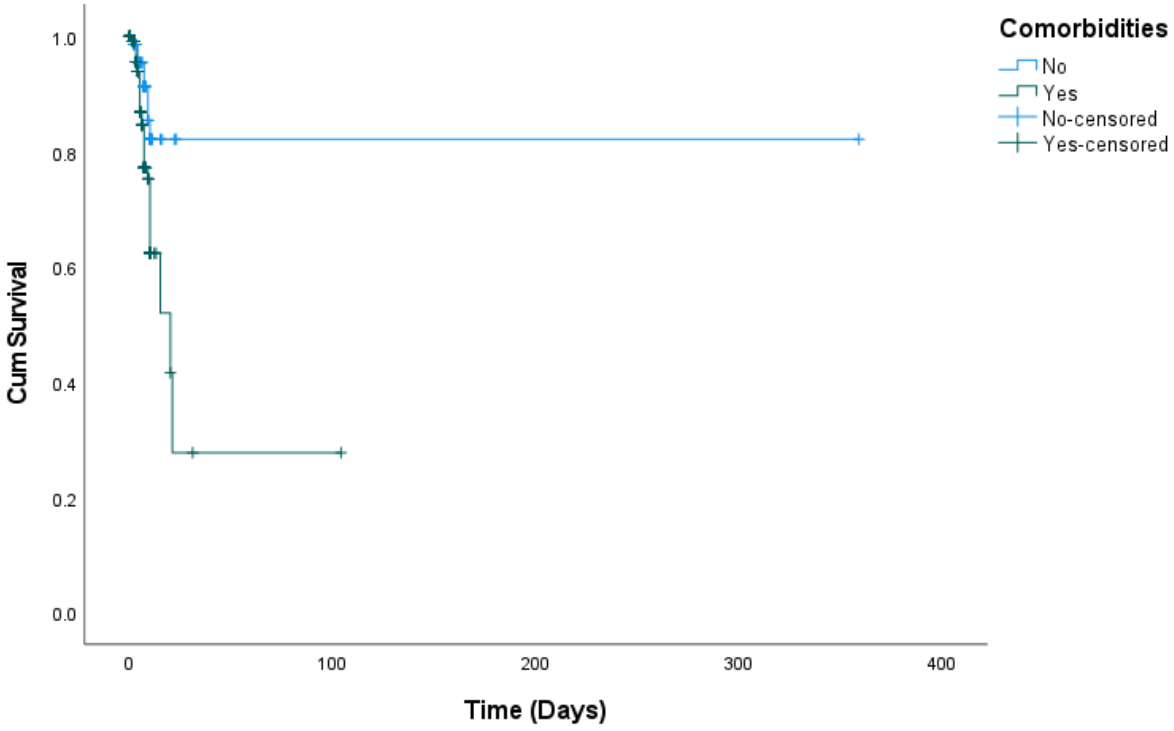

Figure 4. Survival of COVID-19 pneumonia patients with favipiravir usage based on comorbidities.

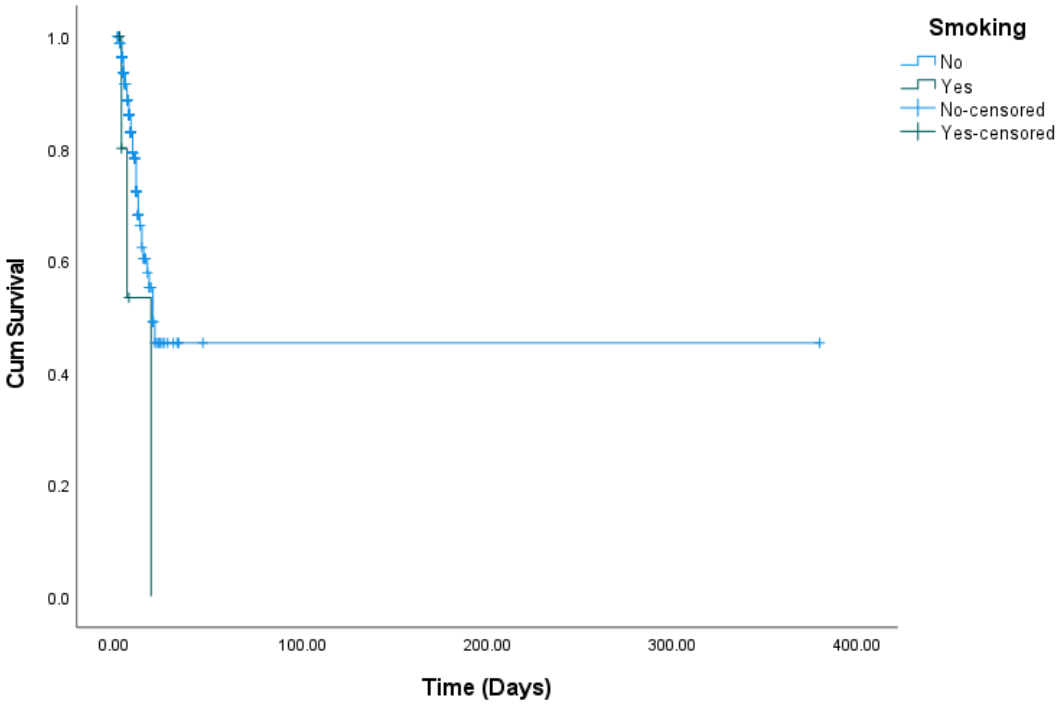

Figure 5. Survival of COVID-19 pneumonia patients with favipiravir usage based on smoking.

4. Discussion

Coronaviruses, including those causing MERS, SARS, and COVID-19, have led to a global health crisis. Favipiravir, an antiviral drug, has shown effectiveness in inhibiting viral replication and speeding up recovery in COVID-19 patients. Studies, including that by Hung et al., highlight its benefits when added to standard care, improving viral clearance and clinical outcomes [10,11]. Despite its use in Saudi Arabia, research remains limited, prompting this study to assess favipiravir's effectiveness and safety in COVID-19 pneumonia patients at the AFHSR.

The patient population had a mean age of 61.47 years, with 55.6% being male, indicating that COVID-19 pneumonia is more severe and common in older adults. Liu et al. reported that 27% of severe cases occur in patients over 60. The average BMI was 31.15 kg/m^2, reflecting common obesity, which is linked to worse outcomes, as noted by Russo et al. Comorbidities, present in 75.1% of patients (notably diabetes and hypertension), were also key risk factors. Abid et al. found a 2.85-fold increased mortality risk for diabetes and a 3.05-fold increased mortality risk for hypertension, particularly in ICU patients. These findings highlight the need for targeted management in high-risk groups [12–14]. COVID-19 pneumonia commonly presents with shortness of breath, a cough, and fever, consistent with typical symptoms. Tavakolifard et al. cited the British Medical Journal, reporting fever (83–98%), a dry cough (57–82%), and dyspnea (18–55%) as common symptoms, with a loss of smell occurring early in mild to moderate cases [15]. Our study observed high corticosteroid use (75.4%) and the frequent administration of macrolides (43.4%) and cephalosporins (35.0%), which were associated with reduced mortality in severe cases. Fernandes et al. noted that the RECOVERY trial found that dexamethasone lowered the 28-day mortality in severe COVID-19 cases, but it is discouraged in mild cases due to risks of accelerating viral replication [16].

Our patients exhibited elevated inflammatory markers, such as CRP, D-Dimer, and ferritin, which are associated with severe COVID-19 and a poor prognosis. Trofin et al. reported that the levels of IL-6, CRP, ferritin, LDH, and D-Dimer rise with disease severity, with D-Dimer predicting severe cases and LDH indicating viral variants [17]. In our study, elevated CRP levels were more frequent among survivors, potentially reflecting a protective immune response. Luan et al. noted that CRP is typically low in viral infections, suggesting

that macrophage activation may drive its elevation in COVID-19 [18]. High D-Dimer levels have been linked to coagulopathy and thrombotic events. However, Rajendran et al. found only a 1.1% incidence of clinical thrombosis in hospitalized COVID-19 patients, questioning the predictive value of D-Dimer for thrombosis despite its association with mortality [19]. Interestingly, survivors in our study had higher WBC counts and LDH levels, possibly indicating an adaptive immune response contributing to better outcomes. In contrast, Shahri et al. found higher WBC counts in non-survivors [20]. Additionally, Li et al. identified the lactic dehydrogenase–lymphocyte ratio (LLR) as a strong predictor of poor prognosis, with LLR > 345 being an independent risk factor for severe outcomes [21,22].

In terms of effectiveness, we found that 21.9% of patients required intubation, and the overall mortality rate was 20.9%. These rates are slightly higher than those reported in other studies of severe COVID-19 patients, suggesting that favipiravir may provide some benefit in managing COVID-19 pneumonia. Choi et al. noted sex-related differences in COVID-19 mortality, with rates of 8.18% in men and 4.54% in women, though women with comorbidities had a higher mortality rate of 9.27%. Hassanipour et al. found that the mortality rate in the favipiravir group was approximately 30% lower than the control group, although the difference was not statistically significant. Our study also observed a 32.3% readmission rate within 15 days, highlighting the need for close monitoring post-discharge, especially for high-risk patients. Overall, our findings align with previous research, supporting favipiravir's effectiveness in treating COVID-19, though the higher mortality rate (20.9%) in our cohort may reflect differences in patient populations, comorbidities, or the timing of treatment [22–24].

5. Conclusions

Our study suggests that favipiravir may benefit COVID-19 management, especially in moderate to severe cases, but several limitations must be considered. The absence of a randomized control group and the variation in the timing of favipiravir administration affect the robustness of our findings. Additionally, the study focused primarily on mortality and did not assess other important outcomes, such as viral load reduction or the symptom duration. Despite these limitations, our results align with previous research, showing that comorbidities like diabetes and hypertension significantly impacted survival. Patients without comorbidities or complications, as well as non-smokers, had better outcomes, while positive sputum or tracheal cultures increased the mortality risk.

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