Review Article

Coronavirus – Do We Know Enough?

Shahzad Ali Jiskani*

Department of Pathology, Indus Medical College, Tando Muhammad Khan, Pakistan.

Abstract: Coronavirus 2019 (COVID-19), previously called as 2019-nCoV, was emerged from Wuhan, China in December 2019. It is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). By 22 March 2020, 323,265 people were infected from this virus, including 13,745 deaths globally. It is declared as pandemic by World Health Organization as it involved 185 countries of the world. World Health Organization also declared it as 6th public health emergency of international concern. COVID-19 presents as various outcomes; asymptomatic (carrier), pneumonia and acute respiratory disease. People of all ages can be affected from this virus but adult population is observed to be involved in high ratio. Additionally, there is possibility that infection can be spread as nosocomial infection to patients and healthcare workers. On chest imaging, ground – glass opacity with bilateral involvement is seen as most common abnormality in patients with pneumonia. Older patients are prone to develop more severe disease as compared to young population. Patients with underlying chronic co-morbidities are also more prone to develop poor outcome. Till now, specific treatment of COVID-19 is not available; however clinical trials are under investigation to see the clinical efficacy of various therapeutic agents in China e.g. remdesivir and chloroquine etc. At this time, standard infection control measures are only possible means for prevention of SARS-CoV-2.

Keywords: COVID-19, SARS-CoV-2, 2019-nCOV, Acute respiratory disease, Pneumonia, Infection.

INTRODUCTION

An outburst of pneumonia was seen due to unidentified reason in Wuhan (China), which was spread, all over the country within one month. It was found later to be caused by 'novel coronavirus' via molecular technology and it was named at first as '2019 novel coronavirus (2019-nCoV)'. The World Health Organization (WHO) then proclaimed new name on 11th February 2020 as 'Corona Virus Disease (COVID-19)'. It is has been now considered as global health threat [1-4]. Later, on the basis of taxonomy, phylogeny and practice, the Committee on Taxonomy of Viruses changed the name of the virus as 'Severe Acute Respiratory Syndrome Coronavirus–2 (SARS-CoV-2)' [5]. On January 30th 2020, WHO affirmed it as Sixth public health emergency of international concern due to its outbreak. Use of internet made this possible to receive information from all global regions and sharing the help to overcome the effects of the virus. But many factors, exact etiology and optimal therapy is still under search [6]. Therefore, we present review of literature, mainly emphasizing on the epidemiological features and clinical findings of coronavirus.

SEVERITY OF COVID-19

While emerging from China, COVID-19 was described as respiratory illness caused by SARS-CoV-2 in 2019 (http:/www.who.it/westernpacific/emergencies/covid-19). The clinical demonstrations of coronavirus are diverse, including asymptomatic (carrier), acute respiratory disease and pneumonia of various levels of severity. Common symptoms of COVID-19 include fever, gastrointestinal symptoms, respiratory symptoms etc. Asymptomatic carrier has no such symptoms with no any abnormality found in their chest radiograph [7, 8]. They are diagnosed only by viral nucleic acid test. The transmission of COVID-19 was observed from human-to-human contact via asymptomatic carriers [4, 7, 9, 10]. In patients with acute respiratory disease (ARD) respiratory symptoms are present along with conformation by laboratory testing. However, chest radiograph may not show any pneumonia signs [11]. Patients suffering from pneumonia caused by COVID-19 contain symptoms of respiratory disease are well as findings on chest radiograph (e.g. CT chest). This third category includes severe pneumonia with respiratory rate (RR) ≥30 per minute, SpO2 ≤93% or PaO2/FiO2 ≤300 mmHg. This category may be associated with respiratory failure [8].

EPIDEMIOLOGY

As of 22 March 2020, World Health Organization data showed 323,265 confirmed cases globally [1]. COVID-19 has been declared as pandemic as it involved 185 countries till now including Pakistan. According to data from WHO confirmed death counts were 13,745 (4.25%). Majority of cases were found in China (81,054), followed by Italy and USA. Italy has more death ratio as compared to China. Highest recovery ratio was found in China. Although, San Marino has highest ratio of total cases per 1 million population (Table **1**, Figs. **1-5**).

*Address correspondence to this author at the Department of Pathology, Indus Medical College, Tando Muhammad Khan, Pakistan.
E-mail: shahzadbaloach289@gmail.com

Table 1. Epidemic of COVID-19 in Countries (WHO).

Country	Total cases	Total deaths	Total recovered	Total cases/ 1 million
China	81,054	3,361	72,440	56
Italy	53,578	4,825	6,072	886
USA	30,291	388	178	92
Spain	28,603	1,756	2,126	612
Germany	24,174	92	266	295
Iran	21,638	1,685	7,635	258
France	14,459	562	1,587	222
South Korea	8,897	104	2,909	174
Switzerland	7,230	85	131	835
UK	5,018	244	93	74
Australia	1,353	7	46	53
Malaysia	1,306	10	139	40
Japan	1,086	36	235	9
Turkey	947	21	-	11
Israel	945	1	37	109
Pakistan	646	3	13	3
Saudi Arabia	511	-	17	15
India	391	7	15	3

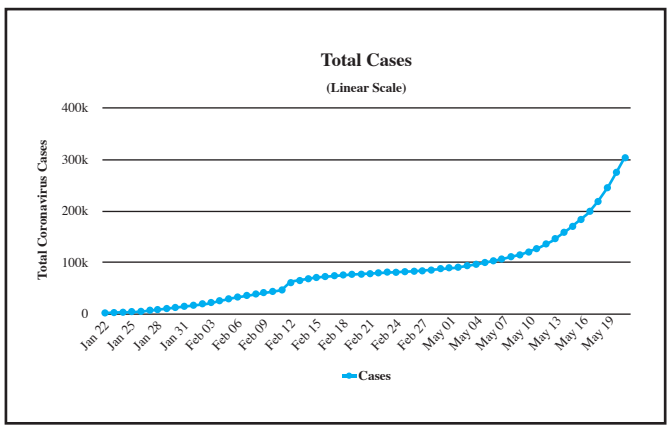

Fig. (1). Total Cases of COVID-19 (WHO).

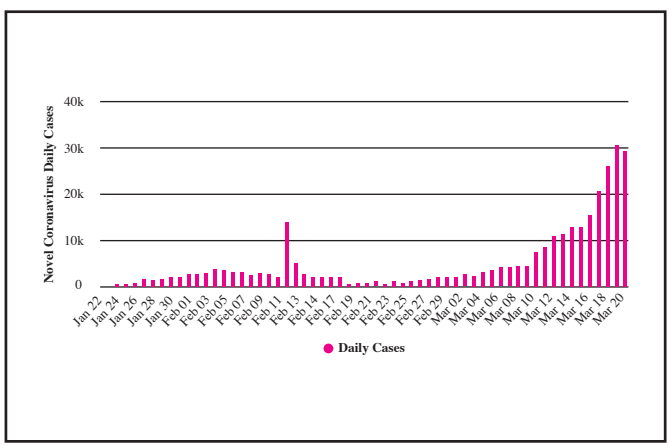

Fig. (2). Daily Frequency of COVID-19 (WHO)

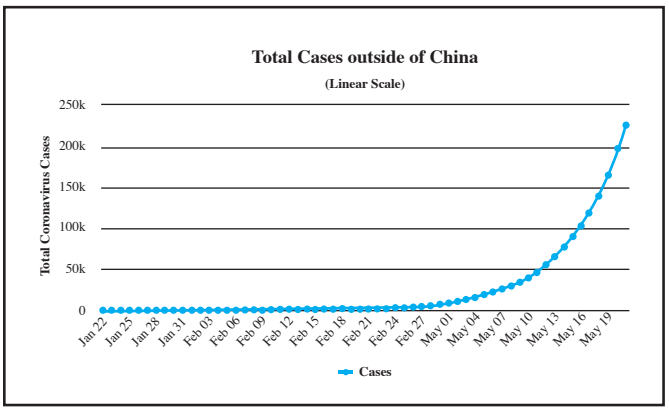

Fig. (3). Total Cases Outside of China (WHO).

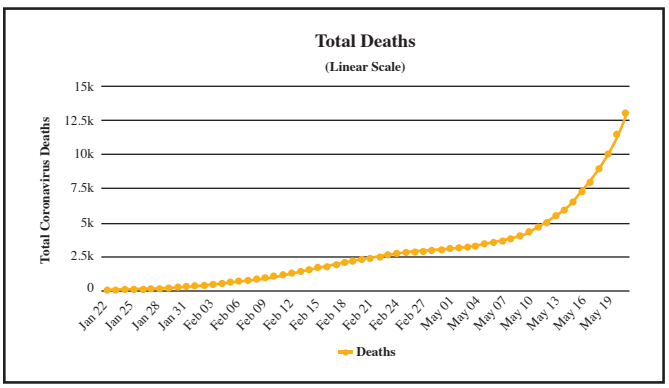

Fig. (4). Total Deaths from COVID-19 (WHO).

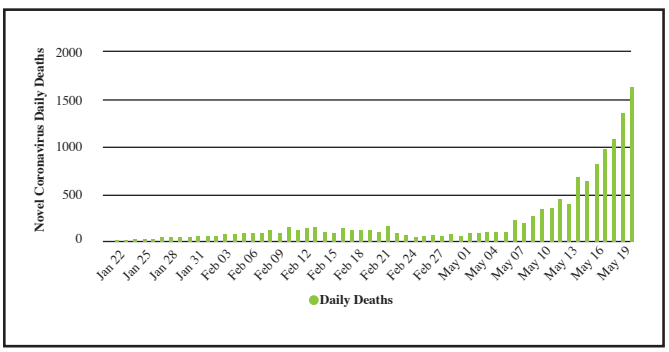

Fig. (5). Daily Death Ratio from COVID-19 (WHO).

AGE AND GENDER DISTRIBUTION

Initially adult patients were considered in Wuhan; but they all those cases had pneumonia [12-14]. Their average age was 55.5, 49 and 56 years in three different studies [12-14]. Another study from Thirty one (31) provinces of China showed average age of 47 years. Another study showed median age of 49 years. Both studies included acute respiratory disease and cases of pneumonia [11-15]. The Chinese Novel Coronavirus Pneumonia Emergency Response Epidemiology Team stated that 29,798 out of 44,672 (66.7%) cases of COVID-19 were in the range of 20 and 60 years [8]. Study

in Korea by Ryu *et al*. showed primary 15 cases were ranged between 25 and 62 years [16]. One more study showed that 6 in 41 patients (14.6%) were ≥65 years. Another study showed that 15 in 99 (15.2%) were ≥70 years [12, 13]. Two non – peered studies showed 153 patients (15.1%) were ≥65 years and 407 patients were ≥70 years [11, 15]. Largest study in China showed that 416 patients (0.9%) were <10 years. Wei et al. reported that 9 infants were infected under 1 years of age [8, 11-14, 16].

Male ratio was seen higher as compared to females. Initially, there was exposure to market of Huanah seafood was seen in about half of the cases, followed by a evidence of human to human transmission on large scale [11-13, 17]. There was no any evidence of vertical transmission in-utero from infection females [18, 19]. Study in Zhongnan Hospital reported 40 cases (29%) were healthcare professionals. Two another studies also showed involvement of medical staff with 23 cases (2.1%) and 1716 cases (3.8%) respectively [8, 11, 14].

MOLECULAR PATHOLOGY OF CORONAVIRUS

Coronaviruses consist of non-segmented, genome of ¬30 kB, positive sense RNA of. The genome consists of structure of 5'cap with 3' tail of poly (A), so that it can act as messenger RNA (mRNA) for replicase polyproteins translation. End 5' end consists of leader sequence and un-translated region (UTR) that have structures of multiple loops needed for replication and transcription of RNA. In addition, transcriptional regulatory sequences (TRSs) are present on starting of every accessory or structural gene which is needed for expression of these genes. 3' end also have RNA structures needed for viral RNA synthesis and replication. The genomic coronavirus organization is 5' – leader – UTR – replicase – S (Spike) – E (Envelope) – M (Membrane) – N (Nucleocapsid) – 3' UTR – poly (A) tail with additional (accessory) genes mixed within 3' end of genomic structural genes [20].

The structure of coronavirus is spherical with 125 nm diameter [21, 22]. The spike projection is club – shaped, originating from surface of the virion, is most characteristic feature of coronavirus. Nucleocapsid is present inside virion envelop. They contain nucleocapsids which are helically symmetrical; this is not common in positive – strand RNA viruses. The virus particles of coronavirus consist of 4 important structural proteins, namely; spike (S), membrane (M), envelop (E) and the nucleocapsid (N) proteins. These proteins are programmed inside 3'end of RNA genome. S protein is ¬150 kDa, uses sequence of N-terminal signal to reach Endoplasmic Reticulum. Spike structure on the virus surface is composed of homotrimers of S-protein encoded virus [23, 24]. The S glycoprotein is trimeric and belongs to fusion protein (Class I) and regulates its host receptor attachment. S protein is broken down by protease of host cell into different polypeptides, namely; S1 and S2 (in some but not all coronaviruses) [25-28]. S1 constitutes the big domain for binding of receptor while S2 makes stalk of spike molecule [29]. Most abundant protein in virion is M protein. It is small sized (¬25 to 30 kDa) protein having three (3) domains which are transmembrane. This protein is considered to provide the shape of virion. It has ectodomain which is little glycosylated N–terminal and encodomain which is bigger C–terminal. Ectodomain surpasses 6 to 8 nm into particle of virus [30, 31]. Co-translationaly, M protein is inserted into membrane of endoplasmic reticulum; though it has no signal sequence [32]. E protein is small (¬8 to 12 kDa) and present in tiny amount inside virion. These proteins are very much conflicting, though they share familiar structural design. E protein consists of ectodomain (N – terminal) and endodomain (C – terminal) and contain activity of ion channel [33]. This protein assists release and assembly of virus [34]. N protein makes up the only protein available inside nucleocapsid. It consists of 2 domains; N–terminal domain and C–terminal domain. Both domains bind RNA in-vitro, but uses diverse mechanisms for binding [35, 36]. This protein is highly phosphorylated and therefore it is able to make structural change, increasing the viral affinity [37-42]. Hemagglutinin – esterase (HE) structural protein is compartment of the β – coronaviruses. It behaves as hemagglutinin, attaches sialic acids on glycoproteins on surface, and consists of activity of acetyl – esterase [43]. By these mechanisms, cell entry and spread of virus by S – protein mediation through mucosa takes place [44].

RISK FACTORS

Most of the risk factors are still unknown, hence many studies showed that bulk amount were having underlying co-morbid conditions [8, 11-14]. Chen *et al*. reported that 51 cases (50.5%) were identified as underlying cerebrovascular and cardiovascular diseases [12]. Guan *et al*. reported that 255 cases (23.2%) were having underlying chronic disorders, hypertension and diabetes mellitus [11]. Another study revealed hypertension was among most common primary chronic disorders in patients infected with COVID-19 (12.8%), diabetes mellitus (5.3%) and cardiovascular disease (4.2%) [8]. Another study showed that patients suffered from severe COVID-19 were prone to have co-morbid conditions as compared to diseases without severity (37.6% and 20.5%, respectively), with p-value of <0.001 [11]. Another study reported high morbidity in severe COVID-19 patients in ICU as compared to patients without ICU support (72.2% and 37.3%, respectively), with p-value of <0.001 [14].

As per these findings, it is observed that most of the COVID-19 patients were adults with middle-age. High prevalence was found in males as compared to females. Nevertheless, healthcare professionals and workers are also at risk of being infected with COVID-19. Patients with underlying co-morbid conditions are more prone to develop severe disease.

INCUBATION PERIOD

Incubation period is defined as the time interval between moment of exposure to the infectious agent and appearance of clinical features of the disease. At the start, Li *et al*. showed that average period of incubation was 5.2 days (4.1 – 7 days) [45]. Another study showed that means incubation period was 4.75 days (3 – 7.2 days) [15]. Backer *et al*. reporter that mean incubation period in patients outside Wuhan with travel history was 6.4 days (2.1 – 11.1 days) [46]. On the other hand Guan et al. suggested that average period of incubation was only 3 days but it can be long up to 24 days [11]. There is variability between data for incubation period which suggests more studies should be done on large population.

CLINICAL MANIFESTATIONS

Asymptomatic (carrier) patients infected with SARD-CoV-2 were previously found which can transfer the virus [7, 8, 47]. As these patients do not show any symptoms, careful monitoring of contact history and natural course may be the only source to identify them.

By looking at the pool study of 970 patients with acute respiratory disease (ARD) according to 2 studies, ratio of male patients was high as compared to females; with mean age of patients was 45 years [11, 48]. Most common underlying co-morbid was hypertension (13.6% and 13.3% respectively), followed by diabetes mellitus (4.5% and 5.7% respectively). Cough was present in two-third patients but fever was seen in only 44.7% of patients. Small number (5%) of patients showed GI symptoms including nausea, vomiting and diarrhoea. Oxygen therapy was needed in 32.4% of patients but no patient needed mechanical ventilation. One patient died with death rate of 0.1%.

Another pooled study on 468 patients as per five (5) studies with detailed descriptive clinical manifestations showed high male predominance (60.3%), with mean age of 53 years [11-14, 48]. Smoking history was observed in one-fifth patients. Most common underlying co-morbid was hypertension (20.5%), diabetes mellitus (14.4%). Fever was seen in 76.3% of patients and cough in 70.5%. One-third patients presented with dyspnoea and sputum production. Nausea/vomiting and diarrhoea were seen as 8% and 6% respectively. Oxygen therapy was needed in 70.9% of patients, while mechanical ventilation was indicated in 28.8% of patients. Renal replacement therapy was given in 5.1% and extracorporeal membrane oxygenation was given in 3.1% patients. The mortality rate observed was 8.2% (Table **2**).

Although, patients having pneumonia were old in age. They had high prevalence of history of smoking, high rate of underlying disease, and symptoms such as fever, fatigue, dyspnoea, nausea, vomiting, headache were present in high rate as compared to ARD patients (p – value <0.05). Additionally, patients with pneumonia had high white blood cell count and neutrophil count. (11-13) Patients with pneumonia required more oxygen therapy, mechanical ventilation, renal replacement therapy and ECMO, and they received more antibiotic therapy and antiviral therapy as compared to ARD patients. Mortality rate was high in patients with pneumonia as compared to ARD (p <0.0001). (Table **3**).

Table 2. Detailed Presentation and Clinical Features of with SARS-CoV-2 Patients.

		Huang *et al.* (n=41) (13)	Chen *et al.* (n=99) (12)	Wang *et al.* (n=138) (14)	Liu *et al.* (n=17) (50)	Guan *et al.* (n=173) (11)
Gender						
	Male (No/%)	30 (73.2%)	67 (67.7%)	75 (54.3%)	10 (58.8%)	100 (57.8%)
	Female (No/%)	11 (26.8%)	32 (32.3%)	63 (45.7%)	7 (41.2%)	73 (42.2%)
Mean Age (years)		49.3	52.7	55.3	54.3	52.3
Smoking History (No/%)		3 (7.3%)	-	-	2 (11.8%)	38 (22%)
Comorbid Conditions						
	Diabetes mellitus (No/%)	8 (19.5%)	-	14 (10.1%)	3 (17.6%)	28 (16.2%)
	Hypertension (No/%)	6 (14.6%)	-	43 (31.2%)	6 (35.3%)	41 (23.7%)
	COPD (No/%)	1 (2.4%)	1 (1%)	4 (2.9%)	3 (17.6%)	6 (3.5%)
	Chronic Kidney Disease (No/%)	-	-	4 (2.3%)	-	3 (1.7%)
	Chronic Liver Disease (No/%)	1 (2.4%)	-	-	-	1 (0.6%)

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		Huang *et al.* (n=41) (13)	Chen *et al.* (n=99) (12)	Wang *et al.* (n=138) (14)	Liu *et al.* (n=17) (50)	Guan *et al.* (n=173) (11)
	Malignancy (No/%)	1 (2.4%)	1 (1%)	10 (7.2%)	-	3 (1.7%)
Presentation						
	Fever (No/%)	40 (97.6%)	82 (82.8%)	136 (98.6%)	17 (100%)	82 (47.4%)
	Cough (No/%)	31 (75.6%)	81 (81.8%)	82 (59.4%)	14 (82.4%)	122 (70.5%)
	Sore throat (No/%)	-	5 (5.1%)	24 (17.4%)	4 (23.5%)	23 (13.3%)
	Dyspnoea (No/%)	22 (53.7%)	31 (31.3%)	43 (31.2%)	6 (35.3%)	65 (37.6%)
	Fatigue (No/%)	18 (43.9%)	11 (11.1%)	96 (69.6%)	12 (70.6%)	99 (75.2%)
	Sputum production (No/%)	11 (26.8%)	-	37 (26.8%)	11 (64.7%)	61 (35.3%)
	Headache (No/%)	3 (7.3%)	8 (8.1%)	9 (6.5%)	3 (17.6%)	26 (15%)
	Diarrhoea (No/%)	1 (2.4%)	2 (2%)	14 (10.1%)	1 (5.9%)	10 (5.8%)
	Nausea/ vomiting (No/%)	-	1 (1%)	19 (13.8%)	2 (11.8%)	12 (6.9%)
	White blood cell (x109/L)	6.9	7.5	4.7	4.6	4.3
	Neutrophil	5.7	5.5	3.3	3.3	NA
	Lymphocyte	0.8	0.9	0.8	0.9	0.8
Treatment						
	Oxygen therapy (No/%)	27 (65.9%)	75 (75.8%)	106 (76.8%)	10 (58.8%)	114 (65.9%)
	Ventilator (No/%)	14 (34.1%)	17 (17.2%)	32 (23.2%)	5 (29.4%)	67 (38.7%)
	Renal Replacement Therapy (No/%)	3 (7.3%)	9 (9.1%)	2 (1.4%)	-	9 (5.2%)
	ECMO (No/%)	2 (4.9%)	3 (3%)	4 (2.9%)	-	5 (2.9%)
	Antibiotic therapy (No/%)	41 (100%)	70 (70.7%)	-	14 (82%)	139 (80.3%)
	Antiviral therapy (No/%)	39 (95.1%)	75 (75.8%)	124 (89.9%)	11 (64.7%)	80 (46.2%)
Outcome						
	Discharged (No/%)	28 (68.3%)	31 (31.3%)	47 (34.1%)	-	5 (2.9%)
	Remained hospitalized (No/%)	7 (17.1%)	57 (57.6%)	85 (61.6%)	10 (58%)	154 (89%)
	Died (No/%)	6 (14.6%)	11 (11.1%)	6 (4.3%)	-	14 (8.1%)

Table 3. Comparison between Acute Respiratory Disease (ARD) and Pneumonia Caused by SARS-CoV-2.

		Acute Respiratory Disease (n=970) [50]	Pneumonia (n=468) [11]	p-value
Gender				
	Male (No/%)	561 (57.8%)	282 (60.3%)	0.3824
	Female (No/%)	409 (42.2%)	186 (39.7%)	
	Mean age (years)	45.1	53.1	<0.0001
	Smoking history (No/%)	122 (12.6%)	43/231 (18.6%)	0.016
Comorb Conditions				
	Hypertension (No/%)	129 (13.3%)	96/369 (26%)	<0.0001
	Diabetes Mellitus (No/%)	55 (5.7%)	53/369 (14.4%)	<0.0001
	Chronic Liver Disease (No/%)	22/926 (2.4%)	2/214 (0.9%)	0.288
	COPD (No/%)	8 (0.8%)	15 (3.2%)	0.0007
	Chronic Kidney Disease (No/%)	5/926 (0.5%)	7/13 (2.3%)	0.0143
	Malignancy (No/%)	7/926 (0.5%)	14/451 (3.3%)	0.0004
Presentation				
	Fever (No/%)	434 (44.7%)	357 (76.3%)	<0.0001
	Cough (No/%)	647 (66.7%)	330 (70.5%)	0.146
	Sputum Production (No/%)	322 (33.2%)	120/369 (32.5%)	0.814
	Fatigue (No/%)	156 (16.1%)	236 (50.4%)	<0.0001
	Dyspnoea (No/%)	143 (14.7%)	167 (35.7%)	<0.0001
	Headache (No/%)	142 (14.6%)	49 (10.5%)	0.0291
	Sore throat (No/%)	136 (14%)	56/427 (13.1%)	0.65
	Nausea/ vomiting (No/%)	46 (4.7%)	34/427 (8%)	0.017
	Diarrhoea (No/%)	36 (3.7%)	28 (6%)	0.0503
	White blood cell (x109/L)	4.9	5.3	0.01
	Neutrophil	2.6	4.4	<0.0001
	Lymphocyte	1.1	0.8	<0.0001
Treatment				
	Oxygen therapy (No/%)	314 (32.4%)	332 (70.9%)	<0.0001
	Mechanical ventilation (No/%)	-	135 (28.8%)	<0.0001

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		Acute Respiratory Disease (n=970) [50]	Pneumonia (n=468) [11]	p-value
	Renal replacement therapy (No/%)	-	23/451 (5.1%)	<0.0001
	ECMO (No/%)	-	14/451 (3.1%)	<0.0001
	Antibiotic therapy (No/%)	505 (52.1%)	264/330 (80%)	<0.0001
	Antiviral therapy (No/%)	336 (34.6%)	229 (48.9%)	<0.0001
Outcome				
	Discharged (No/%)	53 (5.5%)	111 (23.7%)	<0.0001
	Remained hospitalized (No/%)	916 (94.4%)	313 (66.5%)	<0.0001
	Died (No/%)	1 (0.1%)	37/451 (8.2%)	<0.0001

RADIOGRAPHY

Out of 1099 ARD patients of COVID-19, only 162 patients (14.7%) had an abnormal chest radiograph. 840 patients (76.4%) had diverse and abnormal chest images on CT. Most common abnormality seen was ground – glass opacity found in 409 patients (65.5%), followed by shadows of local patches in 409 patients (48.7%) and interstitial abnormalities in 143 patients (17%). Bilateral involvement was observed in 505 patients (50.1%) [11, 49-52]. By the progression of the disease, consolidation and enlargement of ground – glass opacities, solid nodules and enlarged fibrous stripe was seen in follow-up patients on CT chest. On the other hand small fibrous stripe and resolution of ground – glass opacities were associated with improved patients [53, 54].

TREATMENT

Various reports suggest some drugs as potential treatment, although their clinical effectiveness has not yet been established for COVID-19. These include ritonavir/lopinavir, nucleoside analogs, remdesivir, neuraminidase inhibitors, chloroquine, lamivudine, ACE2-based peptides, tenofovir, disoproxil, vinylsulfone protease inhibitor, teicoplanin, 3C-like protease inhibitors and Chinese traditional medicine [55-64].

To date, remdesivir is considered as more evident in literature. Remdesivir showed clinical response to only case in US, although decline in viral load was observed at the time of start of remdesivir [58]. Two large clinical trials were initiated in China. In trials, remdesivir was prescribed as 200mg loading dose at day 1, followed by100mg once daily for 9 days. In – vitro study on chloroquine showed that it worked at entry stage as well as post-entry stages of COVID-19. Additionally, theoretically passive immunization and interferon therapy can be helpful, but there is no strong data to prove this [59-61].

Corticosteroid systemically was given in patients for response control in inflammation caused by SARS-CoV-2 in primary four (4) studies. Nevertheless, corticosteroid may be related to late clearance of MERS-CoV RNA for severely ill patients with MERS. Treatment in early stages with corticosteroid could be related with increase plasma load of SARS-CoV RNA for adults with SARS. Therefore it is not recommended in the treatment of COVID-19 [65-70].

OUTCOMES

According to World Health Organization (WHO), the morality rate of COVID-19 was 2.9%; although this rate varies among different studies [1]. Reports initially showed that the mortality rate was 11 – 15% but later it was seen that it was between 1.4% and 4.3% [11-14]. These differences may be due to differences in their study population, disease severity etc. Studies showed various risk and prognostic factors as well. One study reported lymphopenia, multilocular infiltration, co-infection with bacteria, history of smoking, age and hypertension showed poor prognosis [12, 71]. One study revealed the same characteristics and also told that some indicators such as oxygen therapy, respiratory rate (RR), leukocyte/lymphocyte count and imaging of chest were related to poor clinical prognosis. Increased rate of case fatality also comprised the male gender, age more than 60 years, baseline severe pneumonia diagnosis and late in the diagnosis [15]. CDC China showed that affected individuals more than 80 years of age were having the highest fatality rate (14.8%) [8]. These findings are suggestive that old age is associated with poor outcome.

As we lack proper treatment options for COVID-19, interventions with infection control measures and control of traffic will be helpful to minimize fomite, contact as well as transmission by droplet, and it is the only method to limit the SARS-CoV-2 spread. These interventions of infection control consist of untimely recognition of patients/cases and their related contacts, avoid as much as we can make contact with

individuals with respiratory illness, proper hand hygiene, increase standard prevention of infection and control exercises in healthcare facilities [72-75].

CONCLUSION

This review gives latest and updated COVID-19 information. SARS-CoV-2 can affect patients with any age. This virus can be presented as asymptomatic carriers, pneumonia and acute respiratory disease (ARD). Older patients are more prone to develop severe diseases, especially those with underlying co-morbid conditions. Valuable treatment of SARS-CoV-2 is still not available. Two trials are under investigation to demonstrate clinical effectiveness of remdesivir. At this time, interventions by taking infection control measures are the only ways possible to limit and prevent the spread of SARS-CoV-2.

CONFLICT OF INTEREST

Declared none.

ACKNOWLEDGEMENTS

Declared none.

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