COVID-19

Analysis of COVID-19 Cases and Public Measures in China

Chun-Song Hu [1]

Abstract

This paper briefly analyzes COVID-19 cases during Wuhan lockdown and travel restrictions on 23 January 2020 to 23 June 2020, which included total confirmed, in critical condition, deaths, recovered, and suspected cases in China. Results showed that there were 28,942 suspected cases on February 8, 2020, at the peak; then, it almost declined continually to only several cases. Total confirmed cases were more than 80,000 on March 1, 2020, but less than 84,000, and deaths were more than 3000 on March 4, 2020, but less than 4640, totally, thanks for the right public measures for COVID-19 in China, such as the Wuhan City lockdown and travel restrictions for isolation; positive screening and testing; and establishing a Huoshenshan hospital, a Leishenshan hospital, and a number of Fangcang shelter hospitals, traditional Chinese medicine and a combination of Chinese and western medicine, and the launch of the clinical trials of antiviral drugs (Lianhua Qingwen, remdesivir, and chloroquine). In addition, the iRT-ABCDEF program is very useful to control domestic, imported, and asymptomatic cases. Cases in critical condition decrease continually after the peak of 11,977 cases on February 18, 2020, and recovered cases increase continually to over 78,400 cases due to these right public measures and effective treatments. In recent months, there are only 2 deaths and only about ten cases in critical condition. All in all, these public measures in China are confirmed to be very effective and are worth conducting in countries worldwide.

Keywords COVID-19 · Infectious disease · Prevention · Public heath · SARS-CoV-2

Introduction

The outbreak of a severe respiratory disease [1, 2] at the end of 2019 has already been controlled successfully in China. This emerging infectious disease was ever named a novel coronavirus (2019-nCoV) pneumonia (NCP), and it is a major threat to public health according to the World Health Organization (WHO). Then, this coronavirus SARS-CoV-2 disease was named as COVID-19 by the WHO. Genome sequences from samples of patients confirmed that a novel RNA virus originated from its natural reservoir host—bats [3, 4]. But an animal just represents an intermediate host [5]. And pangolins should also be considered as possible hosts since metagenomic sequencing identified pangolin-associated coronaviruses [6]. The angiotensin-converting enzyme 2 (ACE2) is a possible entry receptor for SARS-CoV-2 binding cell in humans. Here is a preliminary analysis of COVID-19 cases during Wuhan lockdown and travel restrictions on 23 January 2020 to 23 June 2020, which included total confirmed, in critical condition, deaths, recovered, and suspected cases in China.

Methods

Data Collections

Data were collected from January 23, 2020, the date of the Wuhan City lockdown and travel restrictions, to June 23, 2020. The information on total confirmed, in critical condition, deaths, recovered, and suspected cases was from the official website of the National Health Commission (http://www.nhc.gov.cn/xcs/yqtb/list_gzbd.shtml), China.

Statistical Analysis

Statistical analysis was performed by SPSS 17 software with t test for comparisons between two groups. P values < 0.05 were considered to denote statistical significance.

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✉ Chun-Song Hu
cnhucs@163.com

1   Department of Cardiovascular Medicine, Nanchang University, Hospital of Nanchang University, Jiangxi Academy of Medical Science, No. 461 Bayi Ave, Nanchang 330006, Jiangxi, China

Results

Data (Table 1 and Table 2) showed that there was 28,942 suspected cases on February 8, 2020, at the peak; then, it almost declined continually to only several cases. Total confirmed cases were more than 80,000 on March 1, 2020, but less than 84,000, and deaths were more than 3000 on March 4, 2020, but less than 4640, totally, thanks for the right public measures for COVID-19 in China, such as the Wuhan City lockdown and travel restrictions for isolation; positive screening and testing; and establishing a Huoshenshan hospital, a Leishenshan hospital, and a number of Fangcang shelter hospitals, traditional Chinese medicine (TCM) and a combination of Chinese and western medicine, and the launch of the clinical trials of antiviral drugs (Lianhua Qingwen, remdesivir, and chloroquine, etc.). Cases in critical condition decreased continually after the peak of 11,977 cases on February 18, 2020, and recovered cases increased continually to over 78,400 due to these right public measures and effective treatments (Fig. 1). In recent months, there are only 2 deaths and only about ten cases in critical condition.

Discussion

So far, there were over 10 million confirmed cases in the globe after the pandemic of COVID-19 was declared by the WHO [7]. However, there were less 90,000 cases in China mainland. If compared with cases in major countries outside China, COVID-19 cases confirmed in China were earlier but less (definitely, $P < 0.001$). This is highly linked to positive and effective public measures in China. With increasing understanding on the epidemiological, clinical, laboratory, and radiological characteristics; treatment; and clinical outcomes of COVID-19 patients [8, 9], there will be no possible second pandemic in China except for only some domestic, imported, and asymptomatic cases. Here is a brief summary on these powerful measures for prevention and control of COVID-19, and it will be helpful to fight against COVID-19 worldwide.

Lockdown and Travel Restrictions for Isolation

Since increasing evidence shows that human-to-human transmission has occurred among close contacts [10, 11], it is easy to understand that lockdown is very helpful to curb the spread of the epidemic. And, its effect of delaying and halting the outward spread of the SARS-CoV-2 was very positive [12], but it needs to combine with the control of transmission in the community [13]. Extending the statutory holiday and adopting a flexible working system to encourage residents to stay at home, cut off the transmission, and protect vulnerable individuals will effectively isolate the source of infection [14]. COVID-19 more likely affects older males with comorbidities

and can result in severe and even fatal respiratory diseases [15], but there is currently no evidence of maternal-fetal SARS-CoV-2 transmission since no positive results were reported in testing on neonatal throat swabs and breast-milk samples [16–18].

Early Detection and Prohibition of Gatherings

Due to rapid transmissions, large-scale public health interventions need to be implement immediately in cities and rural regions with the pandemic [19]. All visitors were required to wear masks and to be detected by the temperature tests in the very beginning to prevent the spread of COVID-19 due to fever in 83% patients and cough in 82% patients [15]. And, local high-hazard regions had undergone door-to-door screenings for fighting against COVID-19. All confirmed cases and close contacts had been promptly quarantined and closed down for early detection of suspected cases. In many cities and communities, electronic proofs of access and health were required for all visitors to prevent imported COVID-19. A series of bans were issued for prohibiting gathering. Universities and middle schools carried out online courses. Since there were possible asymptomatic cases of potentially COVID-19 infection [20–22], it is very important for isolation of 2 weeks for those closely contacted with confirmed cases.

Releasing Information and Avoiding Panic

The epidemic information was released in time by radio and television, internet, mobile phone, and WeChat. The diagnostic methods and treating programs were unclassified, and experts were invited to popularize scientific propaganda so as to stabilize the mood of residents and avoid possible panic by effective psychological channels. Open letters were widely posted to the community to publicize the harm of COVID-19 as effective preventive measures. Especially, a healthy lifestyle which includes five core elements, "environment-sleep-emotion-exercise-diet" intervention [E(e)SEEDi], also named the magic "polypill" [23], is highly encouraged because of its improvement of one's immunity (Table 3).

Special Hospitals and Clinical Trials for Antiviral Treatment

In order to treat all COVID-19 patients in time, a Huoshenshan hospital, a Leishenshan hospital, and a number of Fangcang shelter hospitals [24] were established in Wuhan which were rare miracles, and significant medical supplies were offered for urgent needs, for example, N95 masks, protective clothings, and ECMO, and many medical teams and famous experts were sent to Wuhan. And, remdesivir [25, 26], a possible effective

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Table 1 Data on COVID-19 cases in China during January 23 to June 23, 2020

Time	Total confirmed cases	Cases in critical condition	Deaths	Recovered cases	Suspected cases
23-June-2020	83,430	12	4634	78,428	18
23-May-2020	82,974	8	4634	78,261	9
22-May-2020	82,971	9	4634	78,258	6
21-May-2020	82,971	8	4634	78,255	7
20-May-2020	82,967	8	4634	78,249	7
19-May-2020	82,965	9	4634	78,244	7
18-May-2020	82,960	10	4634	78,241	3
17-May-2020	82,954	8	4634	78,238	4
16-May-2020	82,947	10	4634	78,227	4
15-May-2020	82,941	11	4633	78,219	3
14-May-2020	82,933	11	4633	78,209	4
13-May-2020	82,929	9	4633	78,195	4
12-May-2020	82,926	10	4633	78,189	4
11-May-2020	82,919	10	4633	78,171	3
10-May-2020	82,918	9	4633	78,144	3
09-May-2020	82,918	9	4633	78,144	3
08-May-2020	82,901	13	4633	78,120	4
07-May-2020	82,886	18	4633	77,993	6
06-May-2020	82,885	23	4633	77,957	4
05-May-2020	82,883	26	4633	77,911	5
04-May-2020	82,881	29	4633	77,853	2
03-May-2020	82,880	33	4633	77,766	3
02-May-2020	82,877	34	4633	77,713	10
01-May-2020	82,875	37	4633	77,685	11
30-April-2020	82,874	38	4633	77,642	9
29-April-2020	82,862	41	4633	77,610	10
28-April-2020	82,858	50	4633	77,578	10
27-April-2020	82,836	50	4633	77,555	9
26-April-2020	82,830	52	4633	77,474	10
25-April-2020	82,827	51	4632	77,394	12
24-April-2020	82,816	49	4632	77,346	17
23-April-2020	82,804	57	4632	77,257	20
22-April-2020	82,798	63	4632	77,207	20
21-April-2020	82,788	78	4632	77,151	35
20-April-2020	82,758	82	4632	77,123	37
19-April-2020	82,747	81	4632	77,084	43
18-April-2020	82,735	85	4632	77,062	48
17-April-2020	82,719	85	4632	77,029	63
16-April-2020	82,367	89	3342	77,944	62
15-April-2020	82,341	95	3342	77,892	63
14-April-2020	82,295	113	3342	77,816	73
13-April-2020	82,249	116	3341	77,738	72
12-April-2020	82,160	121	3341	77,663	72
11-April-2020	82,052	139	3339	77,575	82
10-April-2020	81,953	141	3339	77,525	44
09-April-2020	81,907	144	3336	77,455	53
08-April-2020	81,865	176	3335	77,370	73
07-April-2020	81,802	189	3333	77,279	83
06-April-2020	81,740	211	3331	77,167	89
05-April-2020	81,708	265	3331	77,078	88
04-April-2020	81,669	295	3329	76,964	107
03-April-2020	81,639	331	3326	76,751	114
02-April-2020	81,620	379	3322	76,571	135
01-April-2020	81,589	429	3318	76,408	153
31-March-2020	81,554	466	3312	76,238	172
30-March-2020	81,518	528	3305	76,052	183
29-March-2020	81,470	633	3304	75,770	168
28-March-2020	81,439	742	3300	75,448	174
27-March-2020	81,394	921	3295	74,971	184
26-March-2020	81,340	1034	3292	74,588	189
25-March-2020	81,285	1235	3287	74,051	159
24-March-2020	81,218	1399	3281	73,650	134
23-March-2020	81,171	1573	3277	73,159	132
22-March-2020	81,093	1749	3270	72,703	136
21-March-2020	81,054	1845	3261	72,244	118
20-March-2020	81,008	1963	3255	71,740	106
19-March-2020	80,967	2136	3248	71,150	104
18-March-2020	80,928	2314	3245	70,420	105
17-March-2020	80,894	2622	3237	69,601	119

Table 1 (continued)

Time	Total confirmed cases	Cases in critical condition	Deaths	Recovered cases	Suspected cases
16-March-2020	80,881	2830	3226	68,679	128
15-March-2020	80,860	3032	3213	67,749	134
14-March-2020	80,844	3226	3199	66,911	113
13-March-2020	80,824	3610	3189	65,541	115
12-March-2020	80,813	4020	3176	64,111	147
11-March-2020	80,793	4257	3169	62,793	253
10-March-2020	80,778	4492	3158	61,475	285
09-March-2020	80,754	4794	3136	59,897	349
08-March-2020	80,735	5111	3119	58,600	421
07-March-2020	80,695	5264	3097	57,065	458
06-March-2020	80,651	5489	3070	55,404	502
05-March-2020	80,552	5737	3042	53,726	482
04-March-2020	80,409	5952	3012	52,045	522
03-March-2020	80,270	6416	2981	49,856	520
02-March-2020	80,151	6806	2943	47,204	587
01-March-2020	80,026	7110	2912	44,462	715
29-February-2020	79,824	7365	2870	41,625	851
28-February-2020	79,251	7664	2835	39,002	1418
27-February-2020	78,824	7952	2788	36,117	2308
26-February-2020	78,497	8346	2744	32,495	2358
25-February-2020	78,064	8752	2715	29,745	2491
24-February-2020	77,658	9126	2663	27,323	2824
23-February-2020	77,150	9915	2592	24,734	3434
22-February-2020	76,936	10,968	2442	22,888	4148
21-February-2020	76,288	11,477	2345	20,659	5365
20-February-2020	75,465	11,633	2236	18,264	5206
19-February-2020	74,576	11,864	2118	16,155	4922
18-February-2020	74,185	11,977	2004	14,376	5248
17-February-2020	72,436	11,741	1868	12,552	6242
16-February-2020	70,548	10,644	1770	10,844	7264
15-February-2020	68,500	11,272	1665	9419	8228
14-February-2020	66,492	11,053	1523	8096	8969
13-February-2020	63,851	10,204	1380	6723	10,109
12-February-2020	59,804	8030	1367	5911	13,435
11-February-2020	44,653	8204	1113	4740	16,067
10-February-2020	42,638	7333	1016	3996	21,675
09-February-2020	40,171	6484	908	3281	23,589
08-February-2020	37,198	6188	811	2649	28,942
07-February-2020	34,546	6101	722	2050	27,657
06-February-2020	31,161	4821	636	1540	26,359
05-February-2020	28,018	3859*	563	1153	24,702
04-February-2020	24,324	3219	490	892	23,260
03-February-2020	20,438	2788	425	632	23,214
02-February-2020	17,205	2296	361	475	21,558
01-February-2020	14,380	2110	304	328	19,544
31-January-2020	11,791	1795	259	243	17,988
30-January-2020	9692	1527	213	171	15,238
29-January-2020	7711	1370	170	124	12,167
28-January-2020	5974	1239	132	103	9239
27-January-2020	4515	976	106	60	6973
26-January-2020	2744	461	80	51	5794
25-January-2020	1975	324	56	49	2684
24-January-2020	1287	237	41	38	1965
23-January-2020	830	177	25	34	1072

Table 2 Analysis of CIVID-19 cases during January 23 to June 23, 2020 in China

Cases\times	20,200,123	20,200,223	20,200,323	20,200,423	20,200,523	20,200,623
Total confirmed	830	77150*	81171*	82804*	82974*	83430*
In critical condition	177	9915*	1573*	57*	8*	12*
Deaths	25	2592*	3277*	4632*	4634*	4634*
Recovered	34	24734*	73159*	77257*	78261*	78428*
Suspected	1072	3434*	132*	20*	9*	18*

*$P < 0.001$ when compared with cases on January 23, 2020

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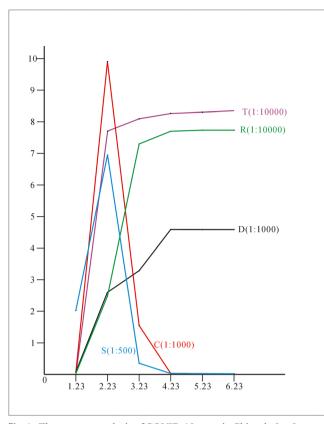SN Compr. Clin. Med. (2020) 2:1306–1312

Fig. 1 The curve on analysis of COVID-19 cases in China during January 23 to June 23, 2020. T(1:10000): total confirmed cases; R(1:10000): recovered cases; D(1:1000): deaths; C(1:1000): cases in critical condition; S(1:500): suspected cases

antiviral drug for the treatment of COVID-19, was imported. Of course, its clinical effect needs to be confirmed by further and large-scale clinical trials.

With the in-depth studies on clinical characteristics of COVID-19 [27]; the establishment of rapid diagnostic methods; integration of traditional Chinese and western medicine; screening specific antiviral drugs in the labs; the launch of the clinical trials on Lianhua Qingwen, remdesivir, and chloroquine due to effective inhibition of SARS-CoV-2 in vitro and in vivo [28, 29], and other drugs; and rapid developing of COVID-19 vaccines, as well as the developed iRT-ABCDEF program [30–34] for domestic, imported, and asymptomatic cases, rolling victory had been achieved in China. In addition, convalescent plasma therapy was well tolerated and could potentially improve the clinical outcomes in severe COVID-19 cases [35].

Conclusion and Prospects

Powerful public measures for combating COVID-19 were in time, rational, right, and scientific. These measures were confirmed to be very effective and are worth conducting worldwide including Brazil and Italy [36] and were highly praised by the WHO and many countries. It is time for global cooperation and information sharing [37, 38]. People should pay more attention to the role of laws on public health since *Health in All Laws* is a better strategy for global health. With the

Table 3 "Environment-sleep-emotion-exercise-diet" intervention [E(e)SEEDi] and immunity

E(e)SEEDi	Immunity (−)	Immunity (+)
External environment	Air pollution and noise or e-noise Lack of social relationship and friendship Lower social-economic status and income	Enjoy sunshine Often communicate with your loved ones
Internal (oneself) environment	Chronic or acute infection Other chronic diseases, such as cardiovascular disease, type 2 diabetes, and cancer	Wash your hands often Wearing a mask
Sleep	Insomnia or sleep not enough Obstructive sleep apnea (OSA) Stay up late	Get enough sleep (7–9 h/night) Have a nap at noon
Emotion	Anxiety or depression Pessimism and thinking the worst Have work pressure or overload Death of a spouse	Smile, be humorous, and optimistic Daydreaming, having a good mood Laughter (stress hormone levels drop) or limit pressure
Exercise	Lack of physical activity Rarely walk or often drive	Adhere to massage Keep exercising Maintain a healthy weight Ride a bike Take deep breaths and practice yoga
Diet	Excessive drinking Overuse of antibiotics Smoking	Do not smoke and limit alcohol consumption Drink more water including honey or lemon water Eat lots of fruits and vegetables Morning or afternoon tea (black tea, green tea, ginseng tea) Often eat deep sea fish, chicken soup, and yogurt

further studies on structures of the SARS-CoV-2 [39–41], and a SI(R) model on the COVID-19 pandemic [42], effective vaccines have been developed and now clinical trials are underway for better fighting against COVID-19.

Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflict of interest.

Ethics Approval Obtained from Nanchang University, Hospital of Nanchang University, Jiangxi Academy of Medical Science, China.

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