Research Article

Recovery time of patients infected from COVID-19 in Pakistan

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Abstract

The present study was aimed to improve the general public understanding of COVID-19 pandemic, current study aims to estimate the recovery time of patients infected from COVID-19. Data for this retrospective study was taken from the Saidu group of teaching hospitals district Swat, Khyber Pakhtunkhwa, Pakistan. The study period was from March 24, 2020, to August 25, 2020. A total of 372 COVID-19 positive cases from March 2020 to August 2020 were included in the study. The entry point of each patient was the date of admission in the hospital and the event of interest was the recovery of a patient from COVID-19. Variables of interest were date of admission, date of discharge, age and gender for all patients. All 372 patients were COVID-19 positive recorded between the first positive to the first negative SARS-CoV-2 PCR test results. The Kaplan Meier estimator was used to obtain the recovery time of patients in days from COVID-19 diagnosis. Present study estimated average time of recovery from COVID-19 in district Swat which was 8 days with 0.95% C.I. (7-9) days. The difference between recovery time for males and females was not significant but the difference between recovery time for age groups was significant using the log-rank test.

Keywords: COVID-19; Kaplan-Meier; Log-rank test; Recovery estimates

Introduction

Coronavirus disease 2019 (COVID-19) started from China and consequently, affected about 170,000 people by 2019 worldwide [1, 2]. On March 11, 2020, the World Health Organization declared the COVID-19 outbreak a pandemic [3]. With the emergence of coronavirus, no country was well equipped to handle the situation properly even the superpowers were unable to control it. They had not sufficient beds, ventilators, medicines, and PPEs. The virus

exposed all deficiencies of powerful and well-developed countries of the world [4]. The first case of COVID-19 in Pakistan was confirmed by the Ministry of Health, government of Pakistan on February 26, 2020, in Karachi, Sindh province [5]. The number of confirmed cases was over 292,000 including 275,000 recovered and 6,231 deaths by August 22, 2020. Sindh has the highest number of cases with 127,691 confirmed cases and 4,458 deaths by August 2020 [6]. On October 28, 2020, the

government of Pakistan announced the second spell of Covid-19 in Pakistan due to sudden increase in active cases and hospital admissions with critical cases of 93 on ventilators across the country [7]. At present, Pakistan has 413,191 confirmed cases with 8,303 deaths and 352,529 recoveries [8]. The difficulties confronting Pakistan because of the COVID-19 are absolute, and it stays not yet clear whether the huge interventions that the government has embraced will be sufficient to take the nation out of this pandemic effectively [9]. Academia worldwide working on better understanding of prevailing situation on multiple factor including recovery time of the disease and meteorological i.e. daily temperature and humidity. Rationale behind recovery time is to manage and arrange the preparation and mechanism at early convenience. It will help to define health and socioeconomic policy as well as planning of health facility, staff, infrastructure and equipment's. This study designed to ascertain COVID-19 recovery time in days during first spell of COVID-19 in district Swat, Pakistan.

Materials and Methods

Study setting

This study includes all confirmed COVID-19 cases admitted at Saidu group of teaching hospitals district Swat during coronavirus outbreak in district Swat, Khyber Pakhtunkhwa Pakistan.

Ethical approval

No consent was obtained from patients included in this study because all cases have already happened before the study begins. Data was taken from hospital records through proper channels meaning that all principles of ethics were followed properly.

Study duration and selection criteria

Data was taken from the hospital database from March 2020 to August 2020. During this time about 645 patients reported to the hospital and 372 were admitted. The admission criteria were predetermined criteria by the government of Pakistan under WHO guidelines [10]. This study only considered 372 COVID-19 positive

admitted patients with their age, sex, date of admission, and date of discharge (including the date of expiry of patients) during the first wave of COVID-19 from March to August 2020.

Data collection and analyses

This study uses a non-parametric survival approach in the analysis. In this study patient's discharge dates were considered as event times, where event time means recovery in days from COVID-19. 372 SARS-CoV-2 PCR tests positive patients were included to investigate recovery from COVID-19. Therefore, we enlisted patients to check their recovery time, infected from COVID-19 in Saidu Group of Teaching Hospitals Swat. The results were incorporated in R and generated using the survfit function.

Results

The (Table 1) shows age and sex distribution of COVID-19 affected patients. The recovery time of patients from COVID-19 disease calculated using Kaplan Meier product limit estimator are presented in (Table 2).

The (Table 1) shows sex and age-wise distribution of COVID-19 patients admitted at Saidu group of teaching hospitals, Swat. Of 372 COVID-19 positive patients 251 (67.47%) were males and 121 (32.53%) were females. About 165 (44.35%) patients have age <60 year and 204 (54.84%) patients were of age 60 or 60 and above.

The (Fig. 1) shows that females and patients having ages 60 or greater are more vulnerable to death as compared to males and ages less than 60.

The (Fig. 2) shows the month-wise distribution of COVID-19 cases during COVID-19 outbreak in district Swat. The 372 admitted cases from March to August 2020 can be seen in (Fig. 2) and are labeled as recovered and died respectively. A huge number of cases were admitted in June 2020, start falling in July, and almost over in August 2020.

The (Table 2) shows the average recovery time of all patients, age-wise, gender-wise, and age-wise (<60 or ≥60) for males and

females separately. Gender wise recovery time of patients was almost the same and there was no significant difference with (Chi-square=0.7, df=1, $p>0.5$). The recovery time of patients concerning different age groups of patients was different. The (Table 2) shows longer recovery period for age group ≥ 60 and the difference was significant with (Chi-square=12.6, df=1, $p<0.001$) using log-rank test. The median of the Kaplan Meier product limit estimator estimated that the average recovery time in days of COVID-

19 patients in males was 8 days with 0.95% C.I. (7-9) days. In females, it was 8 days with 0.95% C.I. (6-11) days. In the age group less than 60 it was, 6 days with 0.95% C.I. (6-8) days, while in the age group 60 or greater the median recovery time was 9 days with 0.95% C.I. (8-11) days. For the overall dataset, it was observed that a COVID-19 patient spent on average 8 days at the hospital to recover/discharged with a minimum of 7 days and a maximum of 9 days.

Table 1. Gender and age-wise distribution of COVID-19 patients

Attributes		No. of patients		Total (n)
		Recovered (%)	Died (%)	
Overall		213 (57.26%)	159 (42.74%)	372
Gender	Male	150 (59.76%)	101 (40.24%)	251
	Female	63 (52.07%)	58 (47.93%)	121
Age	Less than 60 years	113 (68.48%)	52 (31.52%)	165
	60 years and above	98 (48.04%)	106 (51.96%)	204

Table 2. Average (median) recovery time of patients

Patients	N	Events	Median	95% C.I.		Log-rank
Overall	372	213	8 (days)	7 (days)	9 (days)	-----
Males	251	150	8 (days)	7 (days)	9 (days)	0.4
Female	121	63	8 (days)	6 (days)	11 (days)	
Less than 60	165	113	6 (days)	6 (days)	8 (days)	0.0004
Greater or equal 60	204	98	9 (days)	8 (days)	11 (days)

Figure 1. Distribution of patients for total, sex and age

Figure 2. Month wise distribution of COVID-19 cases

Discussion

COVID-19 pandemic severity and its impact on socioeconomic level can be determined using statistical models by calculating its recovery time, mortality and case fatality. Pandemic is usually epidemic spread across the globe with deleterious effects as in the case of COVID-19. We used Kaplan Meier estimator to estimate the average (median) recovery probability of patients at different time points as used previously [10]. In district Swat mean recovery time from COVID 19 has been estimated, which was 08 days with 0.95% C.I. (7-11) days. For the age group less than 60 years the average time of recovery was recorded 6 days with 0.95% C.I. (6-8) days and for the age group 60 or greater it was 9 days with 0.95% C.I. (8-11) days.

Between positive to negative PCR test for SARS-CoV-2 there is high morbidity and mortality reported in individuals having median duration of 11 days [11, 12]. The consortium study of 1420 recovered COVID-19 patients reported a mean disease duration of 11.5 ± 5.7 days [13]. Also, Wu J et al. observed an average time of recovery of 10.63 ± 1.93 for mild to moderate patients [14]. M.P. Barman et al reported [15] average recovery time of 25 days with 95% confidence Interval of 16.14 days to 33.86 days. The difference is expected to be changed in geographical location and secondary source of data and well known polymorphism of angiotensin converting enzyme 2 [16]. Their findings

reflect a large set of population throughout the country. However, recovery time of COVID-19 patient with respect to gender found no statistical difference which is similar to our findings. Our study revealed no statistical difference using Log-rank test of recovery time of disease in context of gender but there seems a significant difference between age groups. Log-rank test shows longer recovery period for age group $> \text{ or } = 60$ and the difference was significant with (Chi-square=12.6, df=1, $p < 0.001$). The average (median) duration (in days) of hospital stay due to COVID-19 has been conveyed in several studies in China as 10-13 days [17].

Conclusion

In this study, the primary event of interest was the average stay of COVID-19 positive patients at the hospital. The follow-up time for this study was five months. The results showed that the average stay of COVID-19 patients in the hospital was 8 days with 0.95% C.I. (6-11) days. For the age group less than 60 years the average time was recorded 6 days with 0.95% C.I. (6-8) days and for the age group 60 or greater it was 9 days with 0.95% C.I. (8-11) days. The recovery time was calculated using the Kaplan Meier technique in R. Further studies should calculate recovery periods for distinct age groups in larger population.

Authors' contributions

Conceived and designed the experiments: N Asghar & U Khalil, Performed the experiments: N Ali, A Ali Khan, DM Khan

& S Ahmad, Analyzed the data: Z khan & I ud Din, Contributed materials/ analysis/ tools: MN Awan, Wrote the paper: S Ahmad, N Asghar & U Khalil.

References

1. Barman MP, Rahman T, Bora K & Borgohain C (2020). COVID-19 pandemic and its recovery time of patients in India: A pilot study. *Diabetes & Metabolic Syndrome: Clin Res & Rev* 14(5): 1205-1211.
2. World Health Organization. Coronavirus disease (2019). (COVID-19) situation report–57. Geneva, Switzerland: World Health Organization; 2020. Available from URL: <https://www.who.int/docs/default-source/coronavirus/situation-reports/20200317-sitrep-57>.
3. World Health Organization. Coronavirus disease (2019). (COVID-19) situation report–51. Geneva, Switzerland: World Health Organization; 2020. Available from URL: <https://www.who.int/doc/default-source/coronavirus/situation-reports/20200311-sitrep-51>.
4. Zaidi SH (2020). Ethics of health care in the Corona pandemic. *Editorial* 7: 70.
5. Abdul W, Khan A, Ali M, Ali A, Baset A (2020). COVID-19 outbreak: current scenario of Pakistan. *New Microbes and New Infections*. 100681.
6. Government of Pakistan. [Cited 2020 August 21]. Available from URL: <http://www.covid.gov.pk>.
7. Junaidi I. Second Covid wave under way in Pakistan. *Dawn*. 28 October 2020. <https://www.dawn.com/news/1587316>.
8. Government of Pakistan. [Cited 2020 December 6]. Available from URL: <http://www.covid.gov.pk>.
9. Clinical Management Guidelines for COVID-19 infections (2020). Government of Pakistan, Ministry of National Health Services, Regulations & Coordination, Document code: 12-01.
10. Kaplan EL & Meier P (1958). Non-parametric estimation from incomplete observations. *J Am Statist Assoc* 53: 457-481.
11. Chen J, Qi T, Liu L, Ling Y, Qian Z & Li T *et al.* (2020). Clinical progression of patients with COVID-19 in Shanghai, China. *Journal of Infection*.
12. Pan A, Liu L, Wang C, Guo H, Hao X & Wang Q, *et al.* (2020). Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. *Jama* 323(19): 1915-1923.
13. Lechien JR, Chiesa Estomba CM, Place S, Van Laethem Y, Cabaraux P & Mat Q *et al.* (2020). Clinical and epidemiological characteristics of 1,420 European patients with mild to moderate coronavirus disease 2019. *Journal of internal medicine*.
14. Wu J, Li W, Shi X, Chen Z, Jiang B & Liu J, *et al.* (2020). Early antiviral treatment contributes to alleviate the severity and improve the prognosis of patients with novel coronavirus disease (COVID-19). *Journal of internal medicine*.
15. Barman MP, Rahman T, Bora K & Borgohain C (2020). COVID-19 pandemic and its recovery time of patients in India: A pilot study. *Diabetes & Metabolic Syndrome. Clin Res & Rev* 14(5): 1205-1211.
16. Li W, Zhang C, Sui J, Kuhn JH, Moore MJ & Luo S, *et al.* (2005). Receptor and viral determinants of SARS-coronavirus adaptation to human ACE2. *The EMBO J* 24(8): 1634-1643.
17. Thai PQ, Dinh TS, Van Hoang TH, Luu NM, Hung LX & Luu NH, *et al.* (2020). Factors associated with the duration of hospitalization among COVID-19 patients in Vietnam: A survival analysis. *Epidemiol & Infec* 10: 1-20.