Global Journals LaTeX JournalKaleidoscope™
Artificial Intelligence formulated this projection for compatibility purposes from the original article published at Global Journals. However, this technology is currently in beta. *Therefore, kindly ignore odd layouts, missed formulae, text, tables, or figures.*

CrossRef DOI of original article: 10.34257/GJMRFVOL21IS4PG39

Comprehensive Overview of 473 Cases of COVID-19: Outcome Experiences of a Dedicated Hospital in Dhaka, Bangladesh

Perveen RA[1], Nasir M[2], Ferdous J[3], urshed M[4], Nazneen R[5] and Rahman MA[6]

[1] Holy Family Red Crescent Medical College

Received: 12 February 2021 Accepted: 3 March 2021 Published: 15 March 2021

Abstract

The study aimed to observe and compare the demographic, comorbidities, biomarkers in different categories of diagnosed COVID-19 patients admitted to a COVID dedicated tertiary care hospital in the pic time of the pandemic, 2020, at Dhaka, Bangladesh.Methods: This retrospective study was conducted from May to September 2020 in 720 bed Holy Family Red Crescent Medical College Hospital. Four hundred seventy-three patients included in this study, diagnosed by RT-PCR of the nasopharyngeal swab, were divided into four groups. The mild group includes 254 patients, the moderate group has 82 patients, 38 patents in the severe group, and the critical group who were admitted to ICU, 99 patients. Demographic data, available investigation reports of individual patients, obtained from hospital records manually and compared between all four different categories of patients.

Index terms— COVID-19, biomarkers, co-morbidities, clinical features, severe, critical, Bangladesh.

1 Introduction

ore than a year has passed since the first diagnosed SARS-CoV-2 infection in Wuhan; China was announced in December 2019. This was an unprecedented year with more than 15 billion documented infections and more than 3.2 million deaths worldwide due to SARS-CoV-2 1 . This large number of infected patients with a case fatality ratio ranges from 0.1% to 25% in different countries demonstrates that the coronavirus disease is extremely contagious 2 . on 11th March 2020, WHO declared COVID-19 a pandemic situation. Near this announcement, Bangladesh reported their first case of COVD-19 on 8th March 2020. From then to 2nd May 2021, Bangladesh deals with 7,60,584 confirmed cases and 11.510 death 3 . Besides Bangladesh, COVID became a concern in the densely populated South Asian region with more than 8 million confirmed cases and 1.2 million deaths up to 17th February, 2021 4 . SARS-COV-2 is a single-stranded enveloped RNA virus that produces symptoms like fever, myalgia, non-productive cough, fatigue, shortness of breath, diarrhea, and many others in affected patients 5 . COVID-19 patients were categorized into mild, moderate, severe, and critical cases for proper management. Mild cases represent Influenza-like illness (ILI), moderate with pneumonia, severe patient with severe pneumonia, sepsis, and with ARDS, septic shock developed in those, considered as critical **??** .

As the pandemic continues, global biomedical researchers are working urgently to identify coronavirus risk factors. Older age and underlying co-morbiditiesparticularly cardiovascular disease, diabetes, respiratory disease, chronic kidney disease, and many more are at high risk of severity 7 .

Besides symptoms and co-morbidities, change in some biomarkers level also reflects the disease severity. Though COVID-19 is a novel disease, Evidence shows severe inflammatory response, which contributes to weak adaptive immune response, thereby resulting in immune response balance in the patient body. Therefore, circulating biomarkers representing inflammation and immune status are potential predictors for the prognosis of COVID -19 patients 8 . Among hematological parameters, disease severity is associated with lymphopenia. Non-survivors of COVID 19 have had significantly less amount of lymphocyte counts than survivors 9 -other blood cells -including white blood cells, neutrophils, and platelets, were partial predictors to differencing mild

cases from severe COVID-19. Other than these, NLR, d-NLR. PLR are indicators of systemic inflammatory response 10,11 .

Besides hematological markers, increased liver and cardiac biomarkers, which reflect dysfunction of these organs, were also observed in the critical group of patients than those with milder disease 12,13,14 . C-reactive protein, serum ferritin level, levels of plasma D-dimers, and fibrin degradation products of COVID patients also correlate with disease severity 15,16,17 .

As this is a novel virus, scientific research is going on throughout the world to know more about how we can manage the patients affected by it. So, we conducted this retrospective study on 473 different categories of admitted COVID-19 patients to highlight their difference between a demographic profile, symptoms, comorbidities, and change on the biomarkers in a tertiary care dedicated hospital.

2 II.

3 Materials and Method

Study design: This observational study was conducted in Holy Family Red Crescent Medical College Hospital (HFRCMCH) from May 17th to September 9th, 2020. HFRCMCH was a 720-bed tertiary care hospital located in Dhaka, Bangladesh. This hospital was assigned responsibility for treating patients with COVID-19 by the People's Republic of Bangladesh on May 15th May 2020, for five months. All RCT-PCR positive (by nasopharyngeal swab) patients treated in HFRCMCH within the period of the study were included. Patients who have insufficient information and discontinued or unavailability of any data, excluded from the study.

4 Data collection method:

The researcher screened all 1348 hospital record files of admitted patients. All the data recorded in a customized form. Researcher divided 473 patients' record files into four groups, the mild group includes 254 patients, the moderate group has 82 patients, the severe group has 38 patients, and the critical group have 99 patients.

Case definition: National Guideline of Bangladesh published on 5th November 2020 categorized the confirmed COVID-19 cases. Mild cases present with fever, cough, sore throat, malaise, headache, muscle pain without shortness of breath, or abnormal imaging. Moderate group of patients have clinical sign of pneumonia with oxygen saturation of more than 90% at ambient air. The severe group of patients have 30 breaths/ minute and finger oxygen saturation less than 90% at rest. The critical group of patients admitted in ICU with respiratory failure or any other organ failure or shock and requiring mechanical ventilation. Though the clinical categories of the patients were discrete by the Triage zone (the zone where sorting of patients occur according to the urgency of their need for care), attending doctors, and attending critical care physicians.

5 Ethical declaration:

The hospital authority and the institutional ethics board of Holy Family Red Crescent Medical College approved the study. Though it is a retrospective study, formal consent was not taken from the patients. However ethical measures were taken throughout the study period to maintain a high standard of confidentiality of patient's hospital record files.

6 Data acquisition and statistical analysis:

We categorized age into eight groups with ten years' interval. We observed demographic data (age, gender, hospital stay, mortality), co-morbidities (DM, HTN, CKD, IHD, Bronchial asthma, Thyroid disease, cancer), symptoms (inflammatory and neurological), and laboratory biomarkers (hematological, inflammatory, hepatic, renal, metabolic). We expressed categorical variables like age range, comorbidities, and symptoms as the counts and percentage and continuous variables like age, hospital stay, and biomarkers as mean and standard deviation. We used SPSS version 21.0 for statistical analysis (chisquare test for qualitative variables and one-way ANOVA for quantitative variables), and all values were two-tailed, with $p < .05$ considered as statistically significant.

7 III.

8 Result

Among 473 patients admitted in the hospital with COVID-19, the mean age of the mild group was 39.04($\pm$12.24) years, gradually increasing in 52.35($\pm$11.92) moderate group, 56.81($\pm$15.51) in severe group and 61.08($\pm$12.76) in critical group, with an age range from 18 to 91 years. Most of the severe and critical patients were in 60-69 years (23.68% and 33.34%), the moderate group were 50-59 years (42.68%), and the mild group were 30-39 years (31.89%). Out of all patients, 359 were male, and 115 were female. The male: female ratio was 1:3.12. Thirtynine patients (39.39%) in ICU and only one patient (2.63%) admitted in the general ward have died.

(Table 1) The presenting symptoms of the patients were variable. The highest percentage of symptoms were shortness of breath (40.38%), fever (33.61%), cough (27.06%) followed by anosmia (10.57%), lethargy (08.03%), diarrhea (06.34%), myalgia (05.71%), loss of taste (04.44%) and sore throat (03.59%). These symptoms

were compared between four groups of patients and were not statistically significant. Fever Regarding co-morbidities, the highest number of patients in all four groups presents with diabetes Mellitus (35.09%) and hypertension (32.55%) than other co-morbidities like ischemic heart disease (09.09%), chronic kidney disease (03.81%), bronchial asthma (05.07%), thyroid-related disorder (02.32%) and neoplasm (01.06%). Among all four groups, the highest (18.50 %), anosmia (17.71%), and cough (14.96%) were the most common in the mild group of patients. Whereas, SOB (57.32%), cough (46.34%), and fever (45.12%) in the moderate group of patients. The severe group of patients complain about similar symptoms in a higher percentage (76.31%, 52.63%, and 31.51%). SOB (85.85%) was the most common symptom, followed by fever (66.66%), cough (32.32%) and anosmia was absent in ICU admitted patients (Table : 3

9 Discussion

The retrospective study revealed the difference in demographic data, age groups, gender, clinical symptoms, and change in the biomarkers in admitted four different clinical categories of COVID-19 patients. Data were recorded from May to September 2020 in the pick of the pandemic to distinguish the relevant factor of disease severity.

The number of male patients (359) admitted to the hospital was much higher than the number of the female (114), which was similar to the other studies worldwide, including Bangladesh 13,18,19,20 . Patients mean age increased from 39 years to above 60 years according to disease severity. The severe and critical group of patients were above 60 years, found to be similar among the same categories patients in other studies 18,19,20,21 .

COVID-19 patients who have co-morbid conditions such as diabetes mellitus (DM), hypertension (HTN), ischemic heart disease (IHD), chronic kidney disease (CKD), and bronchial asthma lead to disease severity, thus increases ICU admission and risk of mortality.

Other observational studies of Bangladesh 22,23, **??**4 , and china 7,14 support similar findings. In our study, mild category patients present with a lower percentage of co-morbid conditions than moderate to critical ones. A lower percentage of patients without comorbidities have a lower case fatality rate (0.9%) 25 .

In this study, patients present with various inflammatory and neurological symptoms, which were almost similar in many studies. But the predominant symptoms vary in different categories of patients. Fever, anosmia, and cough were the most frequent symptoms in the mild group of patients. Whereas shortness of breath, cough, and fever was common and increased in percentage in the other three groups. Anosmia was absent in the critical group. Several studies in Bangladesh 19,20,22,23 and worldwide 7,14 show patients with similar symptoms.

In this study, we observed and compared several biomarkers level like hematological, inflammatory, hepatic, renal, and metabolic between different clinical categories of the COVID-19 patients to focus on disease severity. We found a statistically significant rise of total WBC, NLR (neutrophillymphocyte ratio), d-NLR, PLR (platelet-lymphocyte ratio), and total platelet count, but Hb% and HCT were not statistically remarkable in all four groups of patients. These hematological findings were associated with disease severity, clearly support our study findings 7,9,14 .

Different categories of COVID-19 patients show change in the level of biomarkers. Most of the biomarkers showed significant change except Hb%, HCT, Serum Creatinine, HbA 1 C, and serum lipid profile level. (Table 4) Specially platelets, NLR, d-NLR. PLR were also discriminating mild cases from severe COVID-19 10,11 .

V.

10 Conclusion

The pragmatic observations and outcomes of the study guides, age, co-morbid conditions, and changes in hematological, inflammatory, and hepatic biomarkers, influences the disease severity in COVID-19 cases. However, the commonly observed symptoms were fever, cough, breathlessness in severe and critical cases, whereas anosmia was the common predictor in mild cases. This clinical experience and correlation helped us adopt the management strategy, with the new variant and immune response against it, in our population.

VI.

11 Limitations

The study has few limitations, including a short period, and data were not representing the information of all socioeconomic classes of the country.

Among the inflammatory biomarkers (CRP, d-Dimer, and ferritin), we observed a statistically significant change in CRP levels in different clinical categories of COVID-19 patients. Several studies stated raised levels of the inflammatory marker has a clear connection with the severity of illness 15,16,17 . We found a significant difference in increased SGPT, prothrombin time, and INR between all four categories of COVID-19 patients. Patients with severe COVID-19 appear to have more frequent signs of liver dysfunction than those with milder disease 12,14,17,26 . Changes in the renal and metabolic (Serum creatinine, HbA 1 C, lipid profile) biomarkers were also unremarkable.

1

	Mild case (n= 254)	Moderate case (n=82)	Severe case (n= 38)	Critical case (n=99)
Mean age	39.04± 12.24	52.35± 11.92	56.81± 15.51	61.08± 12.76
10-19years	03/ 254 (0.79%)	-	-	-
20-29years	63/ 254 (24.80%)	02/ 82 (02.44%)	01/ 38 (02.63%)	01/ 99 (01.01%)
30-39 years	81/ 254 (31.89%)	12/ 82 (14.63%)	03/ 38 (07.89%)	06/ 99 (06.06%)
40-49years	57/ 254 (22.44%)	13/ 82 (15.85%)	07/ 38 (18.42%)	08/ 99 (08.08%)
50-59years	36/ 254 (14.17%)	35/ 82 (42.68%)	10/ 38 (26.31%)	27/ 99 (27.28%)
60-69years	12/ 254 (04.72%)	14/ 82 (14.07%)	09/ 38 (23.68%)	33/ 99 (33.34%)
70 and above	04/ 254 (01.57%)	06/ 82 (07.32%)	08/ 38 (21.05%)	24/ 99 (24.25%)
Male/ Female	213/ 42	48/34	27/ 11	71/ 28
Hospital stay in days	12.19± 05.26	12.24± 07.29	10.96± 07.10	12.44± 10.22
Mortality (%)	-	-	01/ 38 (02.63%)	39/ 99 (39.39%)

number of co-morbidities present in critical patients (71.72%, 64.65%, 19.19%, 18.19%, 10.10%) in comparison with the other three groups, which were statistically not significant. Patients with thyroid-related disorder in lowest percentage (0.79%, 04.88%, 02.63%, 04.04%) in all four groups and cancer (02.63%, 04.04%) in severe and critical patients. (Table: 2, Fig: I)

Figure 1: Table 1 :

2

Characteristics	Mild case (n= 254)		Moderate case (n=82)		Severe case (n= 38)		Critical case (n=99)		Statistical Significance
DM	48/ (18.89%)	254	32/ (39.02%)	82	15/ (39.47%)	38	71/ (71.72%)	99	Chi-square =
HTN	43/ (16.93%)	254	37/ (45.12%)	82	10/ (26.31%)	38	64/ (64.65%)	99	48.981.
IHD	08/ (03.14%)	254	12/ (14.63%)	82	04/ (10.52%)	38	19/ (19.19%)	99	p< 0.00001.
CKD	04/ (01.57%)	254	03/ (03.66%)	82	03/ (07.89%)	38	18/ (18.19%)	99	
Bronchial asthma	07/ (07.25%)	254	06/ (07.32%)	82	01/ (02.63%)	38	10/ (10.10%)	99	Result is highly significant at p < .001.

[Note: Figure-1: Co-morbidities of different stages of COVID patients]

Figure 2: Table 2 :

3

Symptoms		Mild case (n= 254)	Moderate case (n=82)	Severe case (n= 38)	Critical case (n=99)
Inflammatory	Fever	47/ 254 (18.50%)	37/ 82 (45.12%)	12/ 38 (31.51%)	63/ 99 (63.64%)
	Cough	38/ 254 (14.96%)	38/ 82 (46.34%)	20/ 38 (52.63%)	32/ 99 (32.32%)
	SOB	30/ 254 (11.81%)	47/ 82 (57.32%)	29/ 38 (76.31%)	85/ 99 (85.85%)
	Sore Throat	10/ 254 (03.94%)	04/ 82 (04.88%)	02/ 38 (05.26%)	01/ 99 (01.01%)
	Diarrhea	10/ 254 (03.94%)	12/ 82 (14.63%)	04/ 38 (10.52%)	04/ 99 (04.04%)
Neurological	Myalgia	13/ 254 (05.12%)	08/ 82 (09.76%)	03/ 38 (07.89%)	03/ 99 (03.03%)
	Lethargy	05/ 254 (01.97%)	12/ 82 (14.63%)	08/ 38 (21.05%)	12/ 99 (12.12%)
	Anosmia Loss of taste	07/ 254 (02.75%)	06/ 82 (07.32%)	02/ 38 (05.26%)	06/ 99 (06.06%)

45/ 254 (17

Figure 3: Table 3 :

4

Biomarkers		Mild case (n= 254)	Moderate case (n=82)	Severe case (n= 38)	Critical case (n=99)	Statist Signif- icance Test
Hematological	Hb%	13.28± 2.32	12.12± 1.67	12.55±1.33	12.33±2.15	p= .38511
	Total WBC	6,622± 2,432	7,778± 3,059	8,766±3,641	10,532±4,174	**p= .00514
	NLR	2.18± 2.37	04.48± 03.17	05.09±03.23	07.56± 5.43	***p= .00001.
	d-NLR	1.68± 1.65	03.36± 02.03	03.93±02.38	05.68± 4.60	***p= .00001.
	PLR	128.35± 62.84	216.81±131.48	206.99±78.99	266.92±178.18	***p= .000018.
	Platelet (10^9/LX)	253 X 10^9± 71 X 10^9	287X 10^9± 103X 10^9	295X 10^9± 83X 10^9	298X 10^9± 99X 10^9	*p= .03780
	HCT	41.13± 6.83	37.93± 4.96	39.47± 4.32	38.69± 5.38	p= .07344
Inflammatory	CRP (mg/ L)	9.70± 10.57	17.39± 13.76	33.56± 28.42	35.49± 27.55	***p= .00022
D dimer (mg/ L)		0.21± 0.59	0.72± 01.73	0.91± 01.38	01.43± 02.05	p= .10693
Ferritin (ng/ml)		295.39±322.41	561.34±560.36	761.43±1020.33	897.20±644.04	**p= .00670
Hepatic	SGPT (IU/ L)	49.78± 36.71	57.73± 45.28	87.50± 83.06	61.82± 44.28	*p= .04231
	Prothrombin time (Sec)	13.97± 2.13	14.49± 02.86	14.64± 02.10	15.97± 02.66	***p= .00002
	INR	1.07± 0.17	01.10± 0.13	01.17± 0.22	01.20± 0.27	***p= .00006
Renal	S. creatinine (mg/ dl)	1.23± 1.19	01.15± 0.31	01.77± 03.33	01.76± 01.91	p= .43251
Metabolic	HbA 1 C (%)	6.12± 1.19	06.45± 1.52	06.39± 1.05	07.45± 01.04	p= .33689
	Total Cholesterol	160.99± 38.77	149.23± 42.57	138.45± 48.22	138.34± 71.32	p= .65832
	Triglyceride	230.28±160.01	189.51±130.99	142.6±71.48	225.54± 94.59	p= .67726
	HDL	31.61± 9.08	34.08± 12.51	34.63± 14.89	28.42± 10.01	p= .07930
	LDL	83.83± 31.71	79.89± 29.76	77.64± 39.61	73.32± 41.65	p= .69925

* stands for significance p<.05, ** stands for significance p<.01, *** stands for significance p<.001

IV.

.1 Acknowledgments

The authors acknowledge the contribution and dedication of all the healthcare workers of Holy Family Red Crescent Medical College Hospital for their services and participation in keeping the manual records of patients' information besides all limitations during the pandemic.

.2 Conflict of Interest

None of the co-authors declared any conflict of interest.

[] , 10.3201/eid1911.130865https://pubmed.ncbi.nlm.nih.gov/24206646/. PMC3837642. https://10.3201/eid1911.130865https://pubmed.ncbi.nlm.nih.gov/24206646/

[] , 10.1016/S0140-6736. PMC7270045. 20 p. .

[] , 10.1111/jth.14768. PMC7166509. https://10.1111/jth.14768

[Dis ()] , Progcardiovasc Dis . 10.1016/j.pcad.2020.03.001. 2020. 63 p. .

[Patients In Seattle (2020)] , Patients In Seattle . 10.1213/ANE.0000000000004830. 32221172. *AnesthAnalg* 2020 Jul. 131 (1) p. .

[American Journal of Internal Medicine ()] , 10.11648/j.ajim.20210901.18. http://doi.org/10.11648/j.ajim.20210901.18 *American Journal of Internal Medicine* 2021. 9 (1) p. .

[Bangladesh (2020)] , Bangladesh . https://dghs.gov.bd/index.php/en/home/5376-novel-coronavirus-covid-19-guidelines 5th November, 2020.

[Tang et al. (2020)] 'Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia'. N Tang , D Li , X Wang , Z Sun . 32073213. *J ThrombHaemost* 2020 Apr. 18 (4) p. .

[Hossain et al. ()] 'An Epidemiological Study of Laboratory Confirmed COVID-19 Cases Admitted in Dhaka Medical College Hospital'. M M Hossain , S H Mark , A Kabir , P Das , M K Islam , A Das . 10.3329/jom.v21i2.50208. https://doi.org/10.3329/jom.v21i2.50208 *Journal of Medicine* 2020. 21 (2) p. .

[Hossain et al. ()] 'Baseline characteristics, level of disease severity and outcomes of patients with COVID-19 admitted to intensive care unit in COVID-19 dedicated Mugda Medical College and Hospital'. Irin Hossain , H Manzurul , Khan , G Shah , M M Tuhin , Shafiur Aktaruzzaman , Ashekur R Rahman , Md Mullick , Nahid Shahin , Adnan Y Yasmin , Monjurulhaque Choudhury . 10.18203/2394-6040.ijcmph20204347. http://dx.doi.org/10.18203/2394-6040.ijcmph2020434724 *Int J Community Med Public Health* Morshed Nasir, RawshanAraPerveen, Sonia Nasreen Ahmad, RumanaNazneen, Shafi Mohammad Parvez Ahmed (ed.) 2020. 7 (10) p. . (Outcome of InstrumentalOxygen Therapy in COVID-19: Survivors Versus Non-survivors in Bangladeshi Cohort)

[Wang et al. ()] 'Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China'. D Wang , B Hu , C Hu , F Zhu , X Liu , J Zhang , B Wang , H Xiang , Z Cheng , Y Xiong , Y Zhao , Y Li , X Wang , Z Peng . 10.1001/jama.2020.1585. 32031570. PMC7042881. https://10.1001/jama.2020.1585 *JAMA* 2020. 323 (11) p. .

[Zhou et al. ()] 'Clinical course and risk factors formortality of adult in patients with COVID-19 in Wuhan. China: a retrospective cohort study'. F Zhou , T Yu , Fan G Dur , Y Liu , Z Liu . org/10.1016/S0140-6736(20)30566-3. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736 *Lancet* 2020. 10229. 395 p. . (20)30566-3/fulltext)

[Ruan et al. ()] 'Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China'. Q Ruan , K Yang , W Wang , L Jiang , J Song . 10.1007/s00134-020-05991-x. 32125452. PMC7080116. https://10.1007/s00134-020-05991-x *Intensive Care Med* 2020. 46 (5) p. .

[Antinori et al. (2020)] 'Compassionate remdesivir treatment of severe Covid-19 pneumonia in intensive care unit (ICU) and Non-ICU patients: Clinical outcome and differences in post-treatment hospitalisation status'. S Antinori , M V Cossu , A L Ridolfo , R Rech , C Bonazzetti , G Pagani , G Gubertini , M Coen , C Magni , A Castelli , B Borghi , R Colombo , R Giorgi , E Angeli , D Mileto , L Milazzo , S Vimercati , M Pellicciotta , M Corbellino , Torre A Rusconi , S Oreni , L Gismondo , M R Giacomelli , A Meroni , L Rizzardini , G Galli , M . 10.1016/j.phrs.2020.104899. 32407959. PMC7212963. https://pubmed.ncbi.nlm.nih.gov/32407959 *Pharmacol Res* 2020 Aug. 2020 May 11. 158 p. 104899.

[Metrics (2021)] *COVID-19 coronavirus outbreak: World Metrics*, World Metrics . https://www.worldometers.info/coronavirus/country/bangladesh/ 2nd May, 2021.

[Metrics (2021)] *COVID-19 outbreak: World Metrics*, World Metrics . https://www.worldometers.k+info/coronavirus/ 2nd May, 2021.

[COVID-19 pandemic in South Asia (2021)] *COVID-19 pandemic in South Asia*, https://www.en.m.wikipedia.org/ 17th February, 2021.

[Henry ()] 'COVID-19, ECMO, and lymphopenia: a word of caution'. B M Henry . PMCID:PMC7118650DOI:https://10.1016/S2213-2600(20)30119-3. 32178774. *Respir Med* 2020. 8 (4) p. 24. (Lancet)

[Hossain et al. ()] 'Demographic and Clinical profile of 190 COVID-19 Patients in a Tertiary Care Private Hospital of Dhaka, Bangladesh: An Observational Study'. H Hossain , T Chowdhury , M Majumder , A Ava , Q A Rahman , - Mdzahiruddin , H Ahasan , Q Islam . 10.3329/jom.v21i2.50210. https://doi.org/10.3329/jom.v21i2.50210 *Journal of Medicine* 2020. 21 (2) p. .

[Estimating mortality from COVID-19. World Health Organization (2020)] *Estimating mortality from COVID-19. World Health Organization*, https://www.who.int/new-rom/commentaries/detail/estimatin-mortality-from-covid-1 4th august,2020.

[Mehta et al. ()] 'HLH Across Speciality Collaboration, UK. COVID-19: consider cytokine storm syndromes and immunosuppression'. P Mehta , D F Mcauley , M Brown , E Sanchez , R S Tattersall , J J Manson . 32192578. *Lancet* 2020. 10229. 395 p. .

[Sommer et al.] *Initial Clinical Impressions of the Critical Care*, P Sommer , E Lukovic , E Fagley , D R Long , J B Sobol , K Heller , V K Moitra , R Pauldine , O' Connor , M F Shahul , S Nunnally , M E Tung , A . COVID-19.

[Zhang et al. (2020)] 'Liver injury in COVID-19: management and challenges'. C Zhang , L Shi , F S Wang . 10.1016/S2468-1253(20)30057-1. 32145190. PMC7129165. *Lancet GastroenterolHepatol* 2020 May. 5 (5) p. .

[Novel Coronavirus (COVID-19) Guidelines] *Novel Coronavirus (COVID-19) Guidelines*, https://pubmed.ncbi.nlm.nih.gov/33219182/6

[Perveen et al. ()] 'Remdesivir and Favipiravir Changes Hepato-Renal Profile in COVID-19 Patients: A Cross Sectional Observation in Bangladesh'. R A Perveen , M Nasir , M Murshed , R Nazneen , S N Ahmad . 10.18535/ijmsci/v8i01.03. https://doi.org/10.18535/ijmsci/v8i01.03 *International Journal of Medical Science and Clinical Invention* 2021. 8 (1) p. .

[Lippi and Lavie] *Sanchis-Gomar F. Cardiac troponin I in patients with coronavirus disease 2019 (COVID-19): Evidence from a meta-analysis*, G Lippi , C J Lavie .

[Nasir et al. ()] 'Survival and Biomarkers of COVID19 Patients Treated with Remdesivir and Favipiravir in ICU during the Peak of Pandemic: A Single Center Study in Bangladesh'. M Nasir , R A Perveen , M Murshed , R Nazneen , K A Talha . 10.9734/jpri/2020/v32i4531088. https://doi.org/10.9734/jpri/2020/v32i4531088 *Journal of Pharmaceutical Research International* 2021. 32 (45) p. .

[Perveen et al. (2020)] 'Systemic Review on Current Antiviral Therapy in COVID-19 Pandemic'. R A Perveen , M Nasir , K A Talha , F Selina , M A Islam . *Med J Malaysia* 2020 Nov. 75 (6) p. .

[Yang et al. ()] 'The diagnostic and predictive role of NLR, d-NLR and PLR in COVID-19 patients'. A P Yang , J P Liu , W Q Tao , H M Li . 10.1016/j.intimp.2020.106504https://pubmed.ncbi.nlm.nih.gov/32304994/. 32304994. PMC7152924. https://10.1016/j.intimp.2020.106504https://pubmed.ncbi.nlm.nih.gov/32304994/ *IntImmunopharmacol* 2020. 84 p. 106504.

[Ying et al. ()] 'The prognostic value of preoperative NLR, d-NLR, PLR and LMR for predicting clinical outcome in surgical colorectal cancer patients'. H Q Ying , Q W Deng , B S He , Y Q Pan , F Wang , H L Sun , J Chen , X Liu , S K Wang . 10.1007/s12032-014-0305-0https://pubmed.ncbi.nlm.nih.gov/25355641/. 25355641. https://10.1007/s12032-014-0305-0https://pubmed.ncbi.nlm.nih.gov/25355641/ *Med Oncol* 2014. 31 (12) p. 305.

[Wang et al. (2020)] 'Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures'. Y Wang , Y Wang , Y Chen , Q Qin . 10.1002/jmv.25748. 32134116. PMC7228347. https://pubmed.ncbi.nlm.nih.gov/32134116/ *J Med Virol* 2020 Jun. 2020 Mar 29. 92 (6) p. .

[Xiang et al. ()] 'Use of national pneumonia surveillance to describe influenza A(H7N9) virus epidemiology'. N Xiang , F Havers , T Chen , Y Song , W Tu , L Li , Y Cao , B Liu , L Zhou , L Meng , Z Hong , R Wang , Y Niu , J Yao , K Liao , Jin L Zhang , Y Li , Q Widdowson , M A Feng , Z . 24206646. *Emerg Infect Dis* 2004-2013. 2013. 19 (11) p. .