Original Research Article

Correlation of novel coronavirus (2019-nCoV) infection with different clinical features and laboratory parameters: An observational study in a rural tertiary care centre

Sanjay Kumar Kannaujia [1], Sanjeev Kumar Singh [2], Naresh Pal Singh [3], Seema Dayal[4], Pinki Pandey[5], Bhanu Pratap Singh[6]*, Neha Khurana[7], Geeta Maurya[1]

[1]Assistant Professor, Department of Pathology, UPUMS, Saifai, Etawah,India
[2]Associate Professor, Department of Pathology, UPUMS, Saifai, Etawah,India
[3]Professor Department of Community Medicine, UPUMS, Saifai, Etawah,India
[4]Professor, Department of Pathology, UPUMS, Saifai, Etawah,India
[5]Professor and Head Department of Pathology, UPUMS, Saifai, Etawah,India
[6]Senior Resident, Department of Community Medicine, Dr. RMLIMS, Lucknow,India
[7]Senior Resident, Department of Microbiology, SSCI&H, Lucknow,India

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Abstract

Background: In December 2019, a novel coronavirus (2019-nCoV) outbreak occurred in Wuhan, China. Now infection named as corona virus disease 2019 (COVID19). According to WHO (updated up to 13 Oct 2020) more than 37 million people worldwide declared confirmed cases. And more than 1 million deaths occurred due to COVID19. **Objective:**To study the clinical features and laboratory parameters among patients infected with 2019-nCoV and to see any significant association of these clinical features and laboratory parameters with different age groups. **Methodology-**All clinical and laboratory parameters were collected from a cohort of patients with 2019-nCoV infection, who were hospitalised to our hospital between 20 April 2020 and 10 May 2020. Statistical analysis had been done to see any significant association. **Results:**Cough and myalgia were frequently in age group of 41-60 years patients. Diabetes mellitus was also frequently present in same age group. Association of sputum history, headache and liver diseases in age group of 21-40 years was also statistically significant. Mean corpuscular volume(MCV) >100, Mean corpuscular haemoglobin concentration (MCHC)<32, Serum glutamic pyruvic transaminase (SGPT)>40, total protein >7.8 in patient age group 21-40 years, were also significant. **Conclusion–**Male population is more commonly affected and fever is not the most common presenting feature.

Keywords: COVID19, 2019-nCoV, cough, myalgia, MCV, MCHC, SGPT

Introduction

The novel corona virus, COVID-19, originated in Wuhan, China has spread rapidly across the globe and it was declared to be a pandemic by World Health Organization (WHO) on 11th March 2020. In the initial days, social distancing has emerged as the most widely adopted strategy for its mitigation and control. [1] Coronaviruses (CoVs) are enveloped, single positive stranded RNA viruses, which belong to the subfamily Coronavirinae. The CoVs genome, ranges from 26 to 32 kilo bases in length and is probably the largest viral RNA known. [2,3] Previously, there were six CoVs known to cause human diseases, and these can be divided into low pathogenic and highly pathogenic CoVs. [3,4]

The low pathogenic CoVs, includes 229E, HKU1, OC43 and NL63, which accounts for 10% to 30% of upper respiratory tract infections and typically causes mild respiratory diseases. [4,5] In contrast, the highly pathogenic CoVs, including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) CoV, predominantly infect lower air- ways and cause fatal pneumonia. [3,6] The epidemiology of COVID-19 is still not clear despite extensive research. The clinical presentation of the disease ranges from asymptomatic carriers to the involvement of respiratory, gastrointestinal, hepatic and neurologic systems that lead to hospitalization of patients in intensive care units and may lead to death. [4] Through this research an attempt was made to assess the organ function in the patients infected with SARS-CoV-2 and their outcome. For this, blood indices from 86 cases were collected.

*Correspondence
Dr. Bhanu Pratap Singh
Senior Resident, Department of Community Medicine, Dr. RMLIMS, Lucknow, India
E-mail: dr.bhanupratap.mpi@gmail.com

Material and Methods

This is a hospital based retrospective cross-sectional and the data including clinical history, laboratory parameters were collected from the record files of the cases, starting from20thApril 2020 to 10th May 2020 from Department of Haematology and Biochemistry and Medicine.

Inclusion criteria: Only COVID-19positive cases admitted in our institute were included in this study.

Exclusion criteria:

1. The sample for laboratory parameters with clotted blood and insufficient quantity.
2. Cases who were not willing to participate.

Methodology:

SARS-CoV-2 testing: Two samples (Nasopharyngeal and Oropharyngeal swab) were collected wearing Personal Protective Equipment (PPE) and both the swabs are put into the same Viral Transport Medium (VTM). This VTM was transported in a triple layer packing to the COVID-19 testing laboratory of our institution under cold chain. qRT-PCR (quantitative Reverse Transcriptase Polymerase Chain Reaction) was done following the manufacturer's protocol for the diagnosis using COVIsure COVID-19 Real Time PCR kit (Genetix Biotech Asia Pvt Ltd., New Delhi, India).

For Haematology and Biochemistry samples: We follow the adequate standard operating procedures (SOPs) which suggest to train the stafffor appropriate specimen collection, storage, packaging, and

transport. All specimens collected for laboratory investigations should be regarded as potentially infectious hence precaution is necessary. The collected samples for haematology were processed on Medonic M-series M32 haematology analyzerand results were noted on patient's forms. For the biochemical parameters samples were centrifuged to separate the serum then processed on fully Automated Biochemistry AnalyzerSelectra PRO Lite machine and results are noted. All results were analyzed using SPSS version 23.Blood parameters like haemoglobin concentration (Hb), total and differential leukocyte count (TLC & DLC), platelet count, mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC), serum glutamic-oxaloacetic transaminase (SGOT), Serum glutamic pyruvic transaminase (SGPT), Blood urea nitrogen (BUN) etc were taken into consideration.

Statistical Analysis: For association of SARS-CoV-2 infection with clinical features and laboratory parameters, Pearson Chi-square test was performed using Statistical Package for the Social Sciences (SPSS) version 23.

Results: The total 86 positive cases were included in this study out of which 63 (73.3%) were males and 23 (26.7%) were females. The maximum number of positive cases 50 (58.1%) belonged to age group between 21-40 years.

Clinical Data

Out of the total positive cases breathlessness accounted for the most common presenting feature accounting for 10.5% of cases followed by cough, myalgia, fever and headache.Among all, 4 (4.7%) patients died during their treatment.

Out of the totalCOVID-19 positive cases, cough and myalgiaweremore commonly seenbetween 41-60 years of age. The history of sputum production was statistically significant between the age group of 21-40 years. Headache was found in 4.7%of total cases out of which it was found to be statistically significant between the age group of 21-40 years. Diabetes mellitus was found only in 4.7% of cases out of which maximum number of cases 3 (3.5%) was found in age group between 40-61 years which is statistically significant. Liver disease was found in only2.4% of total cases and a significant correlation was found between in the age group of 21-40 years and 61-80 years. (Table-1)

Table 1:Association between age group and clinical symptoms of study cases

SN	Clinical features		Age groups				P Value and □2 value
			≤ 20 years	21-40 years	41-60 years	61-80 years	
1.	Fever	YES	00 (0.0%)	02 (2.3%)	03 (3.5%)	00 (0.0%)	P=0.480 □**2=2.474**
		NO	08 (9.3%)	48 (55.8%)	23 (26.7%)	02 (2.3%)	
2.	Cough	YES	00 (0.0%)	02 (2.3%)	03 (3.5%)	01 (1.2%)	P=0.050 * □**2=7.820**
		NO	08 (9.3%)	48 (55.8%)	23 (26.7%)	01 (1.2%)	
3.	Sputum	YES	00 (0.0%)	02 (2.3%)	00 (0.0%)	01 (1.2%)	P=0.003 * □**2=14.119**
		NO	08(9.3%)	48(55.8%)	26(30.2%)	01 (1.2%)	
4.	Breathlessness	YES	00 (0.0%)	04 (4.7%)	05 (5.8%)	00 (0.0%)	P=0.305 □**2=3.625**
		NO	08 (9.3%)	46 (53.5%)	21 (24.4%)	02 (2.3%)	
5.	Myalgia	YES	00 (0.0%)	02 (2.3%)	03 (3.5%)	01(1.2%)	P=0.050 * □**2=7.820**
		NO	08 (9.3%)	48 (55.8%)	23 (26.7%)	01(1.2%)	
6.	Sore-throat	YES	00 (0.0%)	02 (2.3%)	00 (0.0%)	00 (0.0%)	P=0.688 □**2=1.474**
		NO	08 (9.3%)	48 (55.8%)	26 (30.2%)	02 (2.3%)	
7.	Headache	YES	00 (0.0%)	02 (2.3%)	01 (1.2%)	01(1.2%)	P=0.021 * □**2=9.750**
		NO	08 (9.3%)	48 (55.8%)	25 (29.1%)	01(1.2%)	
8.	Vomiting	YES	00 (0.0%)	01 (1.2%)	01 (1.2%)	00 (0.0%)	P=0.913 □**2=0.526**
		NO	08 (9.3%)	49 (57.0%)	25 (29.1%)	02 (2.3%)	
9.	Hypertension	YES	01 (1.2%)	00 (0.0%)	01 (1.2%)	00 (0.0%)	P=0.161 □**2=5.149**
		NO	07 (8.1%)	50 (58.1%)	25 (29.1%)	02 (2.3%)	
10.	Diabetes Meletus	YES	00 (0.0%)	00 (0.0%)	03 (3.5%)	01(1.2%)	P=0.002 * □**2=14.885**
		NO	08 (9.3%)	50 (58.1%)	23 (26.7%)	01(1.2%)	
11.	Liver disease	YES	00 (0.0%)	01 (1.2%)	00 (0.0%)	01(1.2%)	P=0.000 * □**2=20.845**
		NO	08 (9.3%)	49 (57.0%)	26 (30.2%)	01(1.2%)	
12.	Coronary artery disease	YES	00 (0.0%)	00 (0.0%)	01 (1.2%)	00 (0.0%)	P=0.506 □**2=2.335**
		NO	08 (9.3%)	50 (58.1%)	25 (29.1%)	02 (2.3%)	

(*depict the statistically significant values)

Laboratory Findings

Out of 86 COVID-19 positive cases, mild anaemia (9.5 to 10.9 gm/dl) was found in maximum number of cases 19 (22.1%) in the age group between 21-40 years which is statistically insignificant. Statistically significant difference was observed for MCV, MCHC and total protein between study participants of various age groups. The difference of other haemato-biochemical parameters between the age groups was not statistically significant. (Table 2)

Table 2: Association between age group and different laboratory parameters of study cases.

SN	Laboratory parameters		Age groups				P Values
			≤ 20 years	21-40 years	41-60 years	61-80 years	
1.	Hb (gm/dl)	≥11.0	05 (5.8%)	29 (33.7%)	10 (11.6%)	00 (0.0%)	P=0.676
		9.5-10.9	03 (3.5%)	19 (22.1%)	15 (17.4%)	02 (2.3%)	
		8.0-9.4	00 (0.0%)	01 (1.2%)	01 (1.2%)	00 (0.0%)	
		6.5-7.9	00 (0.0%)	01 (1.2%)	00 (0.0%)	00 (0.0%)	
2.	WBC (x10⁹/L)	<4	01 (1.2%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	P=0.105
		4-11	07 (8.1%)	47 (54.7%)	25 (29.1%)	02 (2.3%)	
		>11	00 (0.0%)	03 (3.5%)	01 (1.2%)	00 (0.0%)	
3.	Absolute Neutrophils (x10⁹/L)	<1.6	01 (1.2%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	P=0.116
		1.6-8.8	07 (8.1%)	48 (55.8%)	25 (29.1%)	02 (2.3%)	
		>8.8	00 (0.0%)	02 (2.3%)	01 (1.2%)	00 (0.0%)	
4.	Absolute Lymphocytes (x10⁹/L)	1.6-8.8	08 (9.3%)	47 (54.7%)	24 (27.9%)	02 (2.3%)	P=0.852
		>8.8	00 (0.0%)	03 (3.5%)	02 (2.3%)	00 (0.0%)	
5.	Platelets (x10⁹/L)	<150	01 (1.2%)	16 (18.6%)	08 (9.3%)	01 (1.2%)	P=0.650
		150-450	07 (8.1%)	34 (39.5%)	18 (20.9%)	01 (1.2%)	
6.	ESR (mm/hr)	≤20	08 (9.3%)	46 (53.5%)	24 (27.9%)	02 (2.3%)	P=0.837
		>20	00 (0.0%)	04 (4.7%)	02 (2.3%)	00 (0.0%)	
7.	RBC (Million/cumm)	<3.5	00 (0.0%)	02 (2.3%)	01 (1.2%)	00 (0.0%)	P=0.199
		3.5-5.5	07 (8.1%)	46 (53.5%)	24 (27.9%)	01 (1.2%)	
		>5.5	01 (1.2%)	02 (2.3%)	01 (1.2%)	01 (1.2%)	
8.	Haematocrit (%)	≤39	03 (3.5%)	21 (24.4%)	15 (17.4%)	02 (2.3%)	P=0.239
		>39	05 (5.8%)	29 (33.7%)	11 (12.8%)	00 (0.0%)	
9.	MCV (fl)	<80.0	00 (0.0%)	00 (0.0%)	02 (2.3%)	01 (1.2%)	P=0.009*
		80-100	08 (9.3%)	49 (57.0%)	24 (27.9%)	01 (1.2%)	
		>100.0	00 (0.0%)	01 (1.2%)	00 (0.0%)	00 (0.0%)	
10.	MCH (pg)	<27.0	01 (1.2%)	04 (4.7%)	08 (9.3%)	01 (1.2%)	P=0.192
		27-32	07 (8.1%)	44 (51.2%)	17 (19.8%)	01 (1.2%)	
		>32.0	00 (0.0%)	02 (2.3%)	01 (1.2%)	00 (0.0%)	
11.	MCHC (gm/dl)	<32.0	05 (5.8%)	34 (39.5%)	12 (14.0%)	00 (0.0%)	P<0.001*
		32-35	01 (1.2%)	16 (18.4%)	14 (16.3%)	02 (2.3%)	
		>35.0	02 (2.3%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	
12.	Albumin (gm/dl)	<3.5	00 (0.0%)	03 (3.5%)	01 (1.2%)	00 (0.0%)	P=0.973
		3.5-5.2	08 (9.3%)	46 (53.5%)	24 (27.9%)	02 (2.3%)	
		>5.2	00 (0.0%)	01 (1.2%)	01 (1.2%)	00 (0.0%)	
13.	SGPT(IU/L)	≤40	06 (7.0%)	11 (12.8%)	07 (8.1%)	02 (2.3%)	P=0.003*
		>40	02 (2.3%)	39 (45.3%)	19 (22.1%)	00 (0.0%)	
14.	SGOT(IU/L)	≤40	06 (7.0%)	25 (29.1%)	14 (16.3%)	01 (1.2%)	P=0.627
		>40	02 (2.3%)	25 (29.1%)	12 (14.0%)	01 (1.2%)	

15.	T. bilirubin (mg/dl)	0.2-1.2	08 (9.3%)	47 (54.7%)	26 (30.2%)	02 (2.3%)	P=0.524
		>1.2	00 (0.0%)	03 (3.5%)	00 (0.0%)	00 (0.0%)	
16.	BUN (mg/dl)	8.0-25.0	06 (7.0%)	38 (44.2%)	25 (29.1%)	01 (1.2%)	P=0.101
		>25.0	02 (2.3%)	12 (14.0%)	01 (1.2%)	01 (1.2%)	
17.	S. Creatinine (mg/dl)	<0.5	01 (1.2%)	02 (2.3%)	01 (1.2%)	00 (0.0%)	P=0.948
		0.5-1.5	07 (8.1%)	46 (53.5%)	24 (27.9%)	02 (2.3%)	
		>1.5	00 (0.0%)	02(2.3%)	01(1.2%)	00 (0.0%)	
18.	LDH (U/L)	<125	01(1.2%)	01 (1.2%)	01(1.2%)	00 (0.0%)	P=0.586
		125-220	03 (3.5%)	10 (11.6%)	05 (5.8%)	00 (0.0%)	
		>220	04 (4.7%)	39 (45.3%)	20 (23.3%)	02 (2.3%)	
19.	Total protein (gm/dl)	<6.0	01 (1.2%)	06 (7.0%)	02(2.3%)	02 (2.3%)	P=0.024*
		6.0-7.8	06 (7.0%)	40 (46.5%)	22 (25.6%)	00 (0.0%)	
		>7.8	01 (1.2%)	04 (4.7%)	02 (2.3%)	00 (0.0%)	
20.	ALP (IU/L)	<50	00 (0.0%)	01 (1.2%)	00 (0.0%)	00 (0.0%)	P=0.969
		50-270	06 (7.0%)	38 (44.2%)	20 (23.3%)	02 (2.3%)	
		>270	02 (2.3%)	11 (12.8%)	06 (7.0%)	00 (0.0%)	
21.	CPK (IU/L)	<15	00 (0.0%)	02 (2.3%)	01 (1.2%)	00 (0.0%)	P=0.232
		15-130	07 (8.1%)	46 (53.5%)	20 (23.3%)	01 (1.2%)	
		>130	01 (1.2%)	02 (2.3%)	05 (5.8%)	01 (1.2%)	

The mean haemoglobin value ± SD for male study subjects was 13.03 ± 1.71 gm/dl while for females it was 12.2 ± 1.77 gm/dl and this difference was statistically significant. (P= 0.042). Similarly, statistically significant difference in the mean haemato-biochemical parameters was observed for Haematocrit (P= 0.04), while other parameters like WBC, platelet count, ESR, MCHC etc did not have any significant difference. (Table 3)

Table-3 Comparison of mean values of laboratory parameters with Gender

SN	Various Lab Parameter	Mean Values ± SD		Unpaired T test, P Values
		Male	Female	
1.	Haemoglobin (gm/dl)	13.03±1.71	12.20±1.77	P=0.042*
2.	WBC (x10⁹/L)	7.60±3.66	7.63±2.38	P=0.975
3.	Neutrophils (x10⁹/L)	4.53±3.40	4.00±1.27	P=0.462
4.	Lymphocytes (x10⁹/L)	2.66±0.77	3.20±1.83	P=0.057
5.	Platelet (x10⁹/L)	200.35±82.11	173.22±55.93	P=0.147
6.	Erythrocyte sedimentation rate (mm/hr)	11.19±6.79	12.09±5.75	P=0.575
7.	RBC (million /cumm)	4.66±0.68	4.50±0.48	P=0.324
8.	Haematocrit (%)	39.16±5.15	36.53±5.30	P=0.041*
9.	MCV (fl)	88.23±5.32	87.17±3.47	P=0.391
10.	MCH (pg)	28.73±2.16	28.22±1.13	P=0.290
11.	MCHC (gm/dl)	31.62±1.56	30.94±1.43	P=0.068
12.	Albumin (gm/dl)	4.54±0.49	4.32±0.40	P=0.059
13.	SGPT (IU/L)	68.05±56.36	49.17±22.56	P=0.123
14.	SGOT (IU/L)	42.89±26.28	51.61±25.20	P=0.172
15.	Total bilirubin (mg/dl)	0.72±0.82	0.64±0.38	P=0.638
16.	Blood urea nitrogen (mg/dl)	19.62±18.33	24.30±8.91	P=0.244
17.	S. Creatinine (mg/dl)	0.91±0.34	0.87±0.25	P=0.625
18.	LDL (U/L)	293.29±152.66	288.39±70.01	P=0.883
19.	Total protein (mg/dl)	6.87±0.73	6.58±0.75	P=0.112
20.	Alkaline phosphatase (IU/L)	229.56±126.90	189.26±63.90	P=0.150
21.	Creatinine phosphokinase (IU/L)	102.00±131.69	71.91±80.03	P=0.308

Discussion

In this study we included a total of 86 confirmed cases of COVID-19 to understand the effect of SARS-CoV-2 on various organs of human body. In our study, we found that males were predominantly affected and most of the patients were middle aged between 21 to 40 years. This is supported by a study done by Verma RK, et al. [7] in Uttar Pradesh which concluded that 78.6% of the study population were males and the most affected age group was 21 to 30 years. This could be due to males spending more time outdoors in the conservative Indian society or due to differential seeking of medical care by different sexes.In our study, breathlessness was the most common presenting feature accounting for 10.5% of the total cases. Only 6% of cases were febrile which contrasts with the initial studies on COVID 19 that reported >98% patients presented with fever on admission. [8] The CBC findings of our study showed lower haemoglobin concentration in females (12.20 ± 1.77 gm/dl) than males (13.03 ± 1.71 gm/dl).We also observed reduced HCT (36.53 ± 5.30) and slightly lower RBC (4.50 ± 0.48) levels in females. In addition, there was a significant difference of haemoglobin and HCTlevels between males and females with the following respective *P*-values: (*P*=0.042 and *P*=0.041). The abnormalities of Haemoglobin, HCT, and RBC observed in patients can be explained by the inability of the bone marrow to produce enough RBCs to carry oxygen and due to lung damages induced by the COVID-19 which makes gaseous exchange difficult. These abnormalities correlate to breathlessness being the most common presenting feature observed in the study population. Similar findings were seen in a study done by Djapko, et al. [9] at Hubei, China.The SGOT was elevated in 46.6% cases similar figures were seen in a study done by Kaushik A, et al. [10] at Greater Noida, Uttar Pradesh in which elevated SGOT was seen in 45.71% of cases.Various studies have shown that SARS-CoV-2 virus uses Angiotensin 2 converting enzyme (ACE2) for its entry into the cell and ACE2 is mainly expressed on the cholangiocytes. [11] This can possibly explain the deranged liver enzymes.Our study has some limitations. First, it is a retrospective study which was done using the data collected from a single city. Second, history of liver function test

of the patients was not available for the comparative evaluation of the effect of the virus on liver.

From this study, we concluded that male population is more commonly affected and fever is not the most common presenting feature of this infection. Baseline laboratory indices of the patients can assist the clinicians to formulate treatment approach during the disease.

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