RESEARCH ARTICLE

Evaluation of Mortality in COVID-19, Based on CBC Changes in Comorbid vs. Non-comorbid Patients of Khost Province of Afghanistan

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Abstract

Introduction: The COVID-19 pandemic has resulted in more than 248 million confirmed cases and in excess of 5 million deaths globally until November 2021. Many countries are continuing to experience epidemic waves of COVID-19. The first reported case of COVID-19 in Afghanistan was in Herat province on 24 February 2020; as of 20 July 2021, Afghanistan has reported 156 363 confirmed cases of COVID-19 and 7284 deaths from the disease.

We investigated the mortality rate on COVID-19 in the basis of CBC changes, correlation and impact of comorbid vs non-comorbid on incidence of COVID-19 patients of Khost province of Afghanistan.

Objective: This study aimed to determine and evaluate the mortality rate in COVID-19 in the basis of CBC changes, correlation and impact of comorbid vs. non-comorbid on incidence of COVID-19 patients in Khost province of Afghanistan.

Method and Materials: It is a prospective descriptive cross sectional study on 165 COVID-19 patients of Khost province from 2024/May/17 to 2024/Aug/18. The including parameters were age categories, gender, address, comorbidities, CBC changes and mortality rate of all 165 participants under study that recorded in computer special format. COVID-19 investigation, comorbidities and CBC changes are done by special regents, micro lab, cardiac monitor and other technology for the investigation of comorbidities. Recorded findings processing, comparison and evaluation results have been identified by IBM SPSS-23 version.

Results: The study was conducted during (3) months on 165 COVID-19 patients in SZU and KPH hospitals of Khost province. Initially we described all participants according to age. At the current study, all participants were with (mean age: 59.48 ± 21.37; range: 15-108 years). Statistical description of all participants, according to age categories, gender, address, comorbidities, CBC changes and mortality rate shows that 1-Category: Children (0-12 years): was no incidence. 2-Category: Adolescence (13-18 years): was 9(5.45). 3-Category: Adult (19-59 years): was prevalent 61(36.97), but the 4-Category: Senior adult (60 and above years); was more prevalent 95(57.58). Statistic description of all participants, according to gender shows that male was 83(50.3) and female was 82 (49.7). Statistic description of all participants, according to address shows that rural was more prevalent 137(83.0) than urban 28 (17.0). Statistic description of all participants, according to comorbidities shows that incidence of COVID-19 in comorbidities was prevalent 118(71.52) than non-morbid 47 (28.48). Statistical description of all participants, according to CBC changes shows that WBC were leukocytosis (2.50-43.30; mean: 13.74 ± 7.07). Normal range of CBC (=4.5-11.0 x109 /L) was 67(40.61); Low range of CBC (<4.5 x x109 /L) was 4 (2.42); High range of CBC (>11.0 x109 /L) was 94(56.97). Statistical description of lymphocytes shows that lymphopenia was prevalent (0.90-20.70; mean: 9.06 ± 4.79). Normal range of lymphocytes (20-40%) was 3(1.82); Low range of lymphocytes (< 20%) was 162(98.18); High range of lymphocytes (>40%) was 0(0). Statistic description of granulocytes shows that granulocytosis was prevalent (69.10-96.80; mean: 86.66 ± 5.83). Normal range of granulocytes (50-70%) was 1(0.61); Low range of granulocytes (< 50%) was 0(0); High range of granulocytes (>70%) was 164(99.39). Statistic description of all participants, according to mortality rate shows 18(10.91). Hypotheses summarized by One-Simple Chi-Square test show that incidence of COVID-19 in urban population is low. (p< 0.000) is significant. One-Simple Binomial- test show that COVID-19 has mortality. (p< 0.000) is significant. One-Simple Kolmogorov- Simonov test show that between COVID-19 incidence and high age category have positive relationship. (p< 0.001) is significant. One-Simple Kolmogorov- Simonov test show that in COVID-19 TLC

is high. (p< 0.000) is significant. One-Simple Chi-Square test show that COVID-19 does not have relationship with gender, (p >0.05) and not significant. One-Simple Kolmogorov- Simonov test show that in COVID-19, there is lymphopenia, but (p >0.05) and not significant. One-Simple Kolmogorov-Simonov test show that in COVID-19, granulocytosis is present, but (p >0.05) and not significant.

Conclusion: Overall, findings of our study indicated that adult and senior adult categories of age, comorbidities and CBC changes have a positive relationship with COVID-19 mortality and COVID-19 incidence, which is higher in rural populations than urban. However, this issue needs to further investigations to confirm these findings.

Keywords: COVID-19, comorbidity, non-morbidity, CBC, WBC, leukocytes, granulocytes.

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Introduction

The COVID-19 pandemic has resulted in more than 248 million confirmed cases and in excess of 5 million deaths globally to November 2021.1 Many countries are continuing to experience epidemic waves of COVID-19, including Brazil, India and Nepal.2–4 The first reported case of COVID-19 in Afghanistan was in Herat province on 24 February 2020; as of 20 July 2021, Afghanistan has reported 156 363 confirmed cases of COVID-19 and 7284 deaths from the disease.[1]. Severe acute respiratory syndrome coronavirus 2 has caused over 95 million confirmed cases of COVID-19 and over 2 million deaths worldwide. According to current literature data older adults have higher risk of severe disease and mortality due to COVID-19. It is also known that older adults often do not present typical symptoms of diseases [2]. UN Women, UNICEF and Human Rights Watch jointly issue this fifteenth alert to continue to highlight the gender specific impact of COVID-19 in Afghanistan. This alert focuses on the impact of the COVID-19 pandemic on women and girls' education and the long-lasting consequences it will have on gender equality, women's human rights and Afghanistan's development and peace efforts. It highlights how the health crisis has further reduced already severely limited access to education for women and girls, and how this is likely to have profound and lasting effects with the potential to undermine progress on women's rights and gender equality achieved over the last two decades [3]. There is a growing concern about the COVID-19 epidemic intensifying in rural areas in the United States (U.S.). In this study, we described the dynamics of COVID-19 cases and deaths in rural and urban counties in the U.S.[4]. People living in rural regions in the United States face more health challenges than their non-rural counterparts which could put them at additional risks during the COVID-19 pandemic. Few studies have examined if rurality is associated with additional mortality risk among those hospitalized for COVID-19.[5]. The high mortality rate in Coronavirus Disease (COVID-19) patients is associated with their comorbid conditions. Therefore, it is important to identify risk factors associated with poor outcomes among COVID-19 patients.[6]. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19) has reached a pandemic level. SARS-CoV-2 infects host cells through ACE2 receptors, leading to COVID-19-related pneumonia. The rapid increase in confirmed cases makes the prevention and control of COVID-19 extremely serious. Real-time reverse transcription-PCR (RT-PCR) assays remain the molecular test of choice for the etiologic diagnosis of SARS-CoV-2 infection, while radiographic findings (chest computed tomography [CT]) and antibody-based techniques are being introduced as supplemental tools. Novel virus also cause chronic damage to the cardiovascular system, and attention should be given to cardiovascular protection during treatment for COVID-19. Acute cardiac injury determined by elevated high-sensitivity troponin levels is commonly observed in severe cases and is strongly associated with mortality. This review suggests that cardiovascular comorbidities are common in patients with COVID-19 and such patients are at higher risk of morbidity and mortality. The continuation of clinically indicated ACE inhibitors and ARB medications is recommended in COVID-19. We review the basics of coronaviruses, novel molecular targets for the coronaviruses with a focus on COVID-19, along with their effects on the cardiovascular system.[7]. The new coronavirus, COVID-19 was declared a pandemic by the World Health Organization on March 11, 2020. Risk factors associated with this disease are age, sex, and the presence of comorbidities, the most common being hypertension, diabetes, and heart disease.[8]. Cancer and underlying diseases in the COVID-19 pandemic created more problems for those affected by the coronavirus. This study aimed to evaluate patients'.[9]. Diabetes is a condition that affects a large percentage of the population and it is the leading cause of a wide range of costly complications. Diabetes is linked to a multi-fold increase in mortality and when compared to non-diabetics, the intensity and prevalence of COVID-19 ailment among diabetic individuals are higher. Since its discovery in Wuhan, COVID-19 has grown rapidly and shown a wide range of severity.[10]. The high mortality rate in Coronavirus Disease (COVID-19) patients is associated with their comorbid conditions. Therefore, it is important to identify risk factors associated with poor outcomes among COVID-19 patients. The aims of this study were to find out the comorbidities in cases of death due to COVID-19.[11]. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19) has reached a pandemic level. SARS-CoV-2 infects host cells through ACE2 receptors, leading to COVID-19-related pneumonia. The rapid increase in confirmed cases makes the prevention and control of COVID-19 extremely serious. Real-time reverse transcription-PCR (RT-PCR) assays remain the molecular test of choice for the etiologic diagnosis

of SARS-CoV-2 infection while radiographic findings (chest computed tomography [CT]) and antibody-based techniques are being introduced as supplemental tools. Novel virus also cause chronic damage to the cardiovascular system, and attention should be given to cardiovascular protection during treatment for COVID-19. Acute cardiac injury determined by elevated high-sensitivity troponin levels is commonly observed in severe cases and is strongly associated with mortality. This review suggests that cardiovascular comorbidities are common in patients with COVID-19 and such patients are at higher risk of morbidity and mortality. The continuation of clinically indicated ACE inhibitor and ARB medications is recommended in COVID-19. We review the basics of coronaviruses, novel molecular targets for the coronaviruses with a focus on COVID-19, along with their effects on the cardiovascular system.[12]. The recent coronavirus (COVID-19) outbreak posed a global threat and quickly escalated to a pandemic. However, accurate information on potential relationships between SARS-CoV-2 shedding in body fluids, especially saliva, and white blood cell (WBC) count is limited. In the present study we investigated the potential correlation between alterations in blood cell counts and viral shedding in saliva in a cohort of COVID-19 patients.[13]. Coronavirus disease 2019 (COVID-19) pandemic represents a scientific and social crisis. One of the main unmet needs for coronavirus disease 2019 is its unpredictable clinical course, which can rapidly change in an irreversible outcome. COVID-19 patients can be classified into mild, moderate, and severe. Several haematological parameters, such as platelets, white blood cell total count, lymphocytes, neutrophils, (together with neutrophil, lymphocyte and platelet-lymphocyte ratio), and haemoglobin were described to be associated with COVID-19 infection and severity. The purpose of these review is to describe the current state of the art about complete blood count alterations during COVID-19 infection, and to summarize the crucial role of some haematological parameters during the course of the disease. Decreased platelet, lymphocyte, haemoglobin, eosinophil, and basophil count, increased neutrophil count and neutrophil-lymphocyte and platelet-lymphocyte ratio have been associated with COVID-19 infection and a worse clinical outcome. Our study adds some novelty about the identification of effective biomarkers of progressive disease, and might be helpful for diagnosis, prevention of complications, and effective therapy.[14]. Numerous studies have reported the role of neutrophils in coronavirus disease 2019 (COVID -19) infection, concluding that the percentage of neutrophils may be a predictor of the severity of COVID -19 infection. Therehas been limited research regarding the role of neutrophil precursors in viral infections, including severe acute respiratory syndrome coronavirus 2 infection. The present thus aimed to evaluate the role of the IG count in patients hospitalized due to COVID -19 infection. The patients were predominantly infected with the alpha variant and were all unvaccinated.[15].

Objective

This study aimed to determine and evaluate the mortality rate in COVID-19 in the basis of CBC changes, correlation and impact of comorbid vs non-comorbid on the incidence of COVID-19 patients in Khost province of Afghanistan.

Method and Materials

It is a prospective descriptive cross sectional study on 165 COVID-19 patients of Khost province from 2024/May/17 to 2024/Aug/18. The included parameters were age categories, gender, address, comorbidities, CBC changes and mortality rate of all 165 participants under study that recorded in computer special format. COVID-19 investigation, comorbidities and CBC changes are done by special regents, micro lab, cardiac monitor and other technology for investigation of comorbidities. Recorded findings processing, comparison and evaluation results have been identified by IBM SPSS-23 version.

Results

The study was conducted from 165 participants (mean age: 59.48 ± 21.37; range: 15-108 years). Evaluation of mortality rate in COVID-19 patients in the basis of CBC changes in comorbid vs non-comorbid patients of Khost province is described in the following tables.

Table 1: Descriptive statistics of all 165 participants' COVID-19 patients, according to age categories.

1.Category: Children (0-12 years)%	*2,Category: Adolescence (13-18 years)%*	*3.Category: Adult (19-59 years)%*	*4.Category: Senior adult (60 and above years)%*
0(0)	9(5.45)	61(36.97)	95(57.58)
n = 165(100%)			

According to the results of table-1, the incidence of COVID-19 is prevalent in third, but more prevalent in fourth age categories.

Table 2: Descriptive statistics of all 165 participants' COVID-19 patients, according to gender.

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	M	83	50.3	50.3	50.3
	F	82	49.7	49.7	100.0
	Total	165	100.0	100.0	

According to the results of table-2, the incidence of COVID-19 is higher in male.

Table 3: Descriptive statistics of all 165 participants' COVID-19 patients, according to Address.

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	Urban	28	17.0	16.4	17.0
	Rural	137	83.0	83.0	100.0
	Total	165	100.0	100.0	

According to the results of table-3, the incidence of COVID-19 patients are more prevalent in rural.

Table 4: Descriptive statistics of COVID-19 incidence, according to comorbid vs non-morbid patients.

Comorbid					*Non-morbid*
DM (%)	HTN (%)	COPD (%)	IHD (%)	HF (%)	47(28.48)
14(8.49)	27(16.36)	12(7.27)	9(5.46)	2(1.21)	
DM + HTN	DM + IHD	DM + COPD	HTN + COPD	HTN + IHD	
16(6.70)	2(1.21)	3(1,82)	8 (4,85)	3(1,82)	
COPD + HF	IHD + HF	DM +HTN +COPD	DM +HTN +IHD	COPD +IHD +HF	
1(0.61)	1(0.61)	2(1.21)	6(3.64)	1(0.61)	
DM +IHD +HF	HTN +COPD+ IHD	HTN +IHD+ HF	DM +HTN +IHD+HF		
4 (2.43)	2(1.21)	3(1,82)	2(1.21)		
118 (71.52)					47(28.48)
165 (100)					

According to the results of table-4, the incidence of COVID-19 is higher in comorbid patients.

Table 5: Descriptive statistics of all 165 participants' COVID-19, according to CBC changes.

		N	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*		
TLC		165	2.50	43.30	13.7448	7.07650		
LYMPH		165	.90	20.70	9.0673	4.79633		
GRANOL		165	69.10	96.80	86.6612	5.83063		
Valid N (list wise)		N=165						
CBC changes								
WBC			Lymphocytes			Granulocytes		
N. range = 4.5-11.0 x10^9 /L	Low<4.5 x x10^9 /L	High>11.0 x10^9 /L	N. range = 20-40%	Low< 20%	High> 40%	N. range= 50-70%	Low< 50%	High> 70%
67(40.61)	4 (2.42)	94(56.97)	3(1.82)	162(98.18)	0(0)	1(0.61)	0(0)	164(99.39)
165(100)			165(100)			165(100)		

According to the results of table-5, CBC changes in COVID-19 are leukocytosis, lymphopenia and granulocytosis respectively.

Table 6: Descriptive statistics of mortality rate of COVID-19 patients, according to age categories, gender and comorbid vs non-morbid patients.

	mortality rate			
Age category (%)	*Gender*		*Comorbid*	*Non-morbid*
	Male	*Female*		
2. category (13-18 years) 3 (1,82)	1	2	0	3
3. category (19-59 years) 4 (2.42)	3	1	2	2
4. category (60-& above) 11 (6.67)	10	1	8	3
18 (10.91)	14(8.49)	4(2.42)	10(6.06)	8(4.85)
	n=165 (100)			

According to the results of table-6, the mortality rate of COVID-19 is higher in forth age category, in male gender and in comorbid patients.

Discussion

The study was conducted during (3) months on 165 COVID-19 patients in SZU and KPH hospitals of Khost province. Initially we described all participants according to age. At the current study all participants were with (mean age: 59.48 ± 21.37; range: 15-108 years). A statistical description of all participants according to age categories, gender, address, comorbidities, CBC changes and mortality rate shows that 1-Category: Children (0-12 years): was no incidence. 2-Category: Adolescence (13-18 years): was 9(5.45). 3-Category: Adult (19-59 years): was prevalent 61(36.97), but the 4-Category: Senior adult (60 and above years); was more prevalent 95(57.58). Statistic description of all participants, according to gender shows that male was 83(50.3) and female was 82 (49.7). Statistic description of all participants, according to address shows that rural was prevalent 137(83.0) than urban 28 (17.0). Statistic description of all participants, according to comorbidities shows that incidence of COVID-19 in comorbidities was prevalent 118(71.52) than non-morbid 47 (28.48Statistic description of all participants, according to CBC changes shows that WBC were leukocytosis (2.50-43.30; mean: 13.74 ± 7.07). Normal range of CBC (=4.5-11.0 $x10^9$ /L) was 67(40.61); Low range of CBC (<4.5 x $x10^9$ /L) was 4 (2.42); High range of CBC (>11.0 $x10^9$ /L) was 94(56.97). Statistic description of lymphocytes shows that lymphopenia was prevalent (0.90-20.70; mean: 9.06 ± 4.79). Normal range of lymphocytes (20-40%) was 3(1.82); Low range of lymphocytes (< 20%) was 162(98.18); High range of lymphocytes (>40%) was 0(0). Statistic description of granulocytes shows that granulocytosis was prevalent (69.10-96.80; mean: 86.66 ± 5.83). Normal range of granulocytes (50-70%) was 1(0.61); Low range of granulocytes (< 50%) was 0(0); High range of granulocytes (>70%) was 164(99.39). Statistic description of all participants, according to mortality rate shows 18(10.91). Hypothesis summarized by One-Simple Chi-Square test show that incidence of COVID-19 in urban population is low. (p< 0.000) is significant. One-Simple Binomial- test show that COVID-19 has mortality. (p< 0.000) is significant. One-Simple Kolmogorov- Simonov test show that between COVID-19 incidence and high age category have positive relationship. (p< 0.001) is significant. One-Simple Kolmogorov- Simonov test show that in COVID-19 TLC is high. (p< 0.000) is significant. One-Simple Chi-Square test show that COVID-19 does not have relationship with gender, (p >0.05) and not significant. One-Simple Kolmogorov- Simonov test show that in COVID-19, there is lymphopenia, but (p >0.05) and not significant. One-Simple Kolmogorov-Simonov test show that in COVID-19, granulocytosis is present, but (p >0.05) and not significant.

Another study showed the survey revealed that, to July 2020, around 10 million people in Afghanistan (31.5% of the population) had either current or previous COVID-19 infection. By age group, COVID-19 seroprevalence was reported to be 35.1% and 25.3% among participants aged ≥18 and 5–17 years, respectively. This implies that most of the population remained at risk of infection. However, a large proportion of the population had been infected in some localities, for example, Kabul province, where more than half of the population had been infected with COVID-19.[1].

In another study 3241 confirmed cases of COVID-19-related deaths were identified from 4391 reviewed medical charts. The mean number of COVID-19-related symptoms progressively declined with age, from 2.1 in patients aged < 60 years to 1.7 in those aged 90 years or older (p < 0.001). Moreover, fever, cough, and diarrhea significantly declined with increasing age.[2].

In this study results at the national level showed greater COVID-19 incidence rates in urban compared to rural counties in the Northeast and Mid-Atlantic regions of the U.S. at the beginning of the epidemic. However, the intensity of the epidemic has shifted to a rapid surge in rural areas. In particular, high incidence states located in the Mid-west of the country had more than 3,400 COVID-19 cases per 10 0,0 0 0 people compared to 1,284 cases per 10 0,0 0 0 people in urban counties nationwide during the third period (August 30 to November 12)[3].

This study a retrospective cohort of 3,991 people hospitalized with SARS-CoV-2 infections discharged between March 1 and September 30, 2020 in one of 17 hospitals in North Carolina that collaborate as a clinical data research network. Patient demographics, comorbidities, symptoms and laboratory data were examined. Logistic regression was used to evaluate associations of rurality with a composite outcome of death/hospice discharge. Comorbidities were more common in the rural patient population as were the number of comorbidities per patient. Overall, 505 patients died prior to discharge and 63 patients were discharged to hospice. Among rural patients, 16.5% died or were discharged to hospice vs. 13.3% in the urban cohort resulting in greater odds of death/hospice discharge (OR 1.3, 95% CI 1.1, 1.6). This estimate decreased minimally when adjusted for age, sex, race/ethnicity, payer, disease comorbidities, presenting oxygen levels and cytokine levels (adjusted model OR 1.2, 95% CI 1.0, 1.5). This analysis demonstrated a higher COVID-19 mortality risk among rural residents of NC. Implementing policy changes may mitigate such disparities going forward[4].

In this study A total of 454 patients were included. 78 (17.18%) patients death due to COVID-19, consisting of 52 (66.67%) male and 26 (33.33%) female. Range of ages between 18 and 85 years. The highest mortality rate occurred in the age group ≥60 years (35; 51.47%), followed by the age group of 45–59 years (33; 48.53%), and the age group of <45 years (10; 12%). The prevalent comorbidity was hypertension (42.31%), cardiovascular disease (30.77%), diabetes (28.21%), chronic kidney disease (23.08%), malignancy (15.38%), obesity (15.38%), chronic liver disease (7.69%), chronic respiratory disease (6.41%), immune related disease (3.85%), and non-traumatic cerebral infarction (3.85%). 41 (52.56%) patients reported having two or more comorbidities, and 37 (47.44%) only has one comorbidity. Elevated neutrophil-

tolymphocyte ratio (NLR) ≥3.13 was seen in the majority of patients (68; 87.18%). The mean value of NLR was 20.94.[5].

In another study, patients with diabetes hospitalized because of COVID-19 had a significantly increased risk of CVD (adjusted hazard ratio [AHR], 2.12; 95% confidence interval [CI]: 1.97, 2.27) than those without COVID-19. The risks of coronary heart disease (AHR, 2.00; 95% CI: 1.85, 2.17) and stroke (AHR, 2.21; 95% CI: 1.90, 2.57) were higher in the intervention group than in the control group. In the case of all-cause mortality for middle-aged adults, we observed a higher risk in diabetes patients hospitalized due to COVID-19 than in patients without COVID-19 (AHR, 1.37; 95% CI: 1.18, 1.59).[6].

In this study, the total prevalence of comorbidities in patients with COVID-19 was 42% (95% CI: 25-60), 61% (95% CI: 42-80) in those admitted to the ICU, and 77% (95% CI: 68-86) among death cases; males were the most affected. Hypertension was the most prevalent comorbidity in all three groups studied, accounting for 32%, 26%, and 35%, respectively. The odds ratio of death for a patient with a comorbidity compared to one with no comorbidity was 2.4 (P < 0.0001). The higher the prevalence of comorbidities the higher the odds that the COVID-19 patient will need intensive care or will die, especially if the pre-existing disease is hypertension, heart disease, or diabetes.[8].

In another study showed that out of 55813 patients admitted to the hospital due to COVID-19 on the mentioned date, 4260 died. Furthermore, the most common underlying disease in hospitalized patients due to COVID-19 was hypertension (11.4%). The prevalence of cancers was 1.4%. The highest in-hospital case fatality rate was chronic kidney disease (CKD) (21.3%) and cancer (16.6%). In addition, among the underlying diseases, the odds ratio of CKD was 2.12 (CI90%= 1.38- 3.26), and cancers were 2.06 (CI95%= 1.25-3.37), the most important underlying diseases for odds of death.[9].

In this study a total of 454 patients were included of this study. 78 (17.18%) patients death due to COVID-19, consisting of 52 (66.67%) male and 26 (33.33%) female. Range of ages between 18 and 85 years. The highest mortality rate occurred in the age group I≥60 years (35; 51.47%), followed by the age group of 45–59 years (33; 48.53%), and the age group of <45 years (10; 12%). The prevalent comorbidity was hypertension (42.31%), cardiovascular disease (30.77%), diabetes (28.21%), chronic kidney disease (23.08%), malignancy (15.38%), obesity (15.38%), chronic liver disease (7.69%), chronic respiratory disease (6.41%), immune related disease (3.85%), and non-traumatic cerebral infarction (3.85%). 41 (52.56%) patients reported having two or more comorbidities, and 37 (47.44%) only has one comorbidity. Elevated neutrophil-tolymphocyte ratio (NLR) ≥3.13 was seen in the majority of patients (68; 87.18%). The mean value of NLR was 20.94.[11].

In this study showed that COVID-19, caused by SARS-CoV-2, is a global pandemic. SARSCoV-2 is thought to infect host cells through ACE2 to cause COVID-19, while also causing damage to the myocardium. However, the specific mechanisms are uncertain. Patients with underlying CVD and SARS-CoV-2 infection have an adverse prognosis. Cardiovascular comorbidities are common in patients with COVID-19 and such patients are at higher risk of morbidity and mortality. However, it is not known if the presence of cardiovascular comorbid conditions pose independent risk or whether this is mediated by other factors such as age, Gender, smoking status etc. Therefore, particular attention should be given to cardiovascular protection during treatment for COVID-19.[12].

The results of the present study showed that the levels of WBC, LYM, and NEU as well as erythrocyte sedimentation rate (ESR) increased significantly on the 5th day compared to the first day in both groups with sputum. However, the levels of C-reactive protein (CRP), Neutrophil-to-Lymphocyte Ratio (NLR) and lactate dehydrogenase (LDH) did not show significant changes.[13].

In this study showed that Coronavirus disease 2019 has prominent manifestations from the hematopoietic system. Common haematological abnormalities have been identifiedin COVID-19 patients. Since the early stage of the disease, not only the platelets and lymphocytes but also haemoglobin, eosinophils, and basophils present a marked decrease, associating with the disease severity and clinical outcome. At the moment, the kinetics of monocytes in COVID-19 infection is still undefined, as SARS-CoV-2 infection of monocytes seems to directly impair the anti-viral adaptive immune responses. Finally, an increase of neutrophils and the two markers NLR and PLR seem to correlate with progressive disease. Careful evaluation of laboratory indices at baseline and during the disease course can assist clinicians in formulating a tailored treatment approach and promptly provide intensive care to those who are in greater need. This review has emphasized the importance of laboratory information in the management of COVID-19, further studies are worth describing the association between the dynamic haematological responses and the progression and outcome of the disease.[14].

In this study showed that the mean IG count was 0.03±0.02x109/l in patients with mild/moderate disease, 0.05±0.10x109/l in patients with severe disease and 0.09±0.15x109/l in patients with critical disease. There was a statistically significant difference in the mean values of the IG counts between the three groups of disease severity, with the greatest mean value of IG observed in patients with critical disease (P=0.0001). The mean IG count was 0.05±0.09x109/l in patients with a duration of hospitalization <10 days and 0.07+0.12x109/l in patients with a duration of hospitalization >10 days. There was a statistically significant difference in the mean values of IG counts between the patients with a duration of hospitalization >10 and <10 days (P=0.029).[15].

Another study showed that a total of 277 (60%) were male and 185 (40%) female. Clinically, 32 (6.9%) had severe illness

and 430 (93.1%) showed moderate clinical disease. Organ failure occurred in 2.8% of the patients. There was significant leucocytosis, neutrophilia, lymphopenia, high neutrophil-lymphocyte (N/L) ratio, and anemia in patients with severe COVID-19 diseases as well as in non-survivors' cases ($p<0.001$). Similarly, the inflammatory markers (C-reactive protein [CRP] and serum ferritin) were significantly elevated in the above-mentioned 2 groups ($p<0.001$). Significant decrease of the platelets count was detectable in clinically severe cases and non-survivors ($p<0.01$). Older age (>60 years) was associated with high leucocyte, neutrophil count, lymphopenia, anemia, organ failure, and poor outcome.[16].

Our study indicated that, adult and senior adult categories of age, comorbidities and CBC changes have significant correlation with COVID-19 mortality and COVID-19 incidence higher in rural population than urban. However, this issue needs to further investigations to confirm these findings.

Conclusion

Overall, findings of our study indicated that, adult and senior adult categories of age, comorbidities and CBC changes have positive relationship with COVID-19 mortality and COVID-19 incidence which is higher in rural population than urban. However, this issue needs to further investigations to confirm these findings.

Suggestions

According to the research findings, in spite of the (5) proposed strategies, recommended by the ministry of public health of Afghanistan for controlling COVID-19 [17;18]. We have the following suggestions:

- The incidence of COVID-19 is exceptionally high among individuals at the age of (60) and above. The ministry of public health and other relevant agencies should take special preventive measures for people in this age category.
- Unlike other countries, the spread of COVID-19 is higher in rural areas compared to urban locations, primarily due to the failure of the vaccination program. The ministry of public health and other relevant agencies should strengthen the vaccination program in rural areas and establish effective mechanisms for its implementation.
- The incidence of COVID-19 is higher in comorbid patients. The ministry of public health and relevant agencies should develop and implement the following programs for the diagnosis, prevention, and treatment of comorbidities.
- The COVID-19 mortality rate remains high. The ministry of public health and relevant agencies should provide complete facilities for the care protocol of COVID-19 patients and take action to maintain and equip the health centers for COVID-19.

Reference

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