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Assessment the Variation and Severity of Signs and Symptoms in Relation to ABO Groups among Covid-19 Patients

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ABSTRACT— Studies suggested a relation between ABO blood groups and COVID-19 infection severity. A study found that blood group O persons were less likely to become infected with SARS-CoV compared to non-blood group O. This may be due to the genetic association of ABO blood groups with susceptibility to COVID-19 also Rh(D) phenotypes (positive and negative zRh blood types) or ABO grouping of covid-19 patients may be related to immune response. The current study is cross sectional study that had occurred from 17th December in 2020 until 3rd April in 2021. Data collected from 518 patient with covid19. This study found that age group (20-29) years had higher frequency of infection. Predominant blood groups among infected patients were (34.1%), (28.3%), (21.3%) for O^+, A^+, B^+ respectively. High percentage of severe infection among blood group A^+ while high frequency of O^+ patients were mild to moderate infections about (45.9%). Infected patients had blood group O^+,A^+,B^+,AB^+,O^-,B^-,A^- and AB^- respectively from high to low percentage. The severity of signs and symptoms was higher for individuals with blood group A^+.

KEYWORDS: Signs And Symptomes; Abo Groups; Covid-19 Patients, Severity.

1. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the strain of coronavirus that causes coronavirus disease 2019 (COVID-19).

Since the emergence of the first case of COVID-19 in December 2019 (Wuhan, China), the infection has become pandemic spreading to more than 300 nations [1]. Up to the fifth of June 2020, 11,241,655 total cases have been reported with a mortality rate of 4.7% (total deaths = 530,668cases). Up-to-date, there has been no effective therapy or vaccine [1], [2] studies suggest that susceptibility to covid-19 infection affected by ABO blood groups in other word related to genetic system. These studies, revealed that blood group O was associated with low risk of infection while group A, B, or AB was associated high risk factor for covid-19 infection [3]. During SARS-CoV outbreak (2002–2003), a hospital based study was conducted and it revealed that hospital workers with group O were less likely to be infected with SARS-CoV compared to non-O hospital workers. Rh(D) phenotypes (positive and negative zRh blood types) are associated with very few diseases compared to ABO. [4]. Like ABO, Rh type is important for type compatibility and immune response [4].

Aim of study Explore ABO and Rh blood groups distribution and clinical characteristics in patients with

COVID-19 and the severity of clinical characteristics.

2. Objectives

1. Identify the distribution of covid19 infected patients according to ABO blood group.
2. Correlate severity of signs and symptoms of covid19 patients with ABO blood groups.
3. Identify the relation between past medical history and severity of covid19 infection.
4. Verify outcome of covid19 patients.

3. Patients and methods

• Type of the study: - The current study is cross sectional study that had occurred from 17th December in 2020 until 3rd April in 2021 to assess the variation and severity of signs and symptoms in relation to ABO groups among COVID-19 patients. Study sample: - The study sample is simple random sample included Covid 19 patients in Iraq. Data collected from patients online

• Questionnaire: - The questionnaire used for data collection was designed in Arabic language. All data management done by manual statistical methods.

4. Results

The study was conducted in Iraq and data collected from 518 patient with covid19. The predominant blood groups among infected patients were 176 34.1%), 146(28.3%), 110(21.3%) for O+,A+,B+ respectively table (1). High percent of covid19 patients with O+ were normal BMI 44(55%) have a moderate infection. while overweight and obese patients were have a mild infection of 11(52.3%). Table (2). The severity of covid19 infections was as follow, most of O+ patients were mild to moderate infections of 80(45.9%), 85(48.8%) respectively. The A+ patients were also have a mild 69(46.9%) to moderate 66(44%) infections, shown in table (3). Regarding the relation of covid19 patient's gender correlated with blood groups, Most of blood group O+ in severe infection were male 9(90%) while female1(10%)in the mild and moderate infection the female were 57(69.5%),48(62.4%) respectively table (4). The data included different age groups, higher frequency was for age group age (20-29) about 276(57.1%) while lower frequency was for 60 years and more 24(1.7%) in table (5). About the signs and symptoms of covid19 the majority of patients were complaining from fever (69.4%), Table (6). The outcome of covid19 patients was in 77.7% had a complete recovery while 22.3% still had suffering from some symptoms (figure 1). About past medical history of patients the most of patients were healthy and not suffering from any diseases 87% except many of them had hypertension 4%, asthma 3%, heart disease 3%, immune disease 2% and diabetes mellitus 1%. Figure (2).

Table (1) The frequency of covid-19 infection according to ABO blood group

Blood Group	Number	%
A+	146	28.3%
A-	8	1.6%

ABO groups	**severity**	9		**BMI**							1.7%		
A+	MILD	3	75%	31	48.5%	19	42.3%	6	37.5%	0	0	3	100%
	MODERA	1	25%	26	40.6%	24	53.3%	8	50%	4	66.6	0	0

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Table (2): Classification of COVID-19 severity according to blood group and BMI of patients

											%		
	SEVER	0	0	7	10.9%	2	4.4%	2	12.5%	2	33.3 %	0	0
Total		4	100 %	64	100%	45	100%	16	100%	6	100 %	3	100%
-A	MILD	0	0	0		2	66.65 %	0	0	0	0	0	0
	MODERA	0	0	4	100%	1	33.35 %	0	0	0	0	0	0
	SEVER	0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	4	100%	3	100%	0	0	0	0	0	0
B+	MILD	0	0	24	57.3%	14	53.8%	5	31.3%	3	60%	1	50%
	MODERAT	0	0	16	38%	11	42.4%	8	50%	1	20%	1	50%
	SEVER	0	0	2	4.7%	1	3.8%	3	18.7%	1	20%	0	0
Total		0	0	42	100%	26	100%	16	100%	5	100 %	2	100%
B-	MILD	0	0	2	66.65 %	4	100%	2	100%	0	0	0	0
	MODERAT	0	0	1	33.35 %	0	0	0	0	0	0	0	0
	SEVER	0	0	0		0	0	0	0	0	0	0	0
Total		0	0	3	100%	4	100%	2	100%	0	0	0	0
AB+	MILD	0	0	10	47.8%	5	33.3%	0	0	0	0	1	100%
	MODERAT	0	0	8	38%	7	46.7%	4	66.65 %	0	0	0	0
	SEVER	0	0	3	14.2%	3	20%	2	33.35 %	0	0	0	0
Total		0	0	21	100%	15	100%	6	100%	0	0	1	100%
AB-	MILD	0	0	2	50%	0	0	0	0	0	0	0	0
	MODERAT	0	0	2	50%	0	0	0	0	0	0	0	0
	SEVER	0	0			0	0	0	0	0	0	0	0
Total		0	0	4	100%	0	0	0	0	0	0	0	0
O+	MILD	1	20%	32	40%	24	52.5%	11	52.5%	2	40%	2	33.35 %
	MODERAT	4	80%	44	55%	19	41.3%	8	38%	2	40%	4	66.65 %
	SEVER	0	0	4	5%	3	6.2%	2	9.5%	1	20%	0	0
Total		5	100 %	80	100%	46	100%	21	100%	5	100 %	6	100%
O-	MILD	1	50%	5	45.5%	1	50%	0	0	0	0	0	0

	MODERAT	1	50%	6	54.5%	1	50%	1	100%	1	100 %	1	100%
	SEVER	0	0	0	0	0	0	0	0	0	0	0	0
Total		2	100 %	11	100%	2	100%	1	100%	1	100 %	1	100%

Table (3) The relationship between severity of covid19 and ABO blood groups

Blood groups	Severity					
	Mild		Moderate		Sever	
	number	%	number	%	number	%
A+	69	46.9%	66	45%	12	8.1%
Total	147					100%
-A	2	25%	6	75%	0	0
Total	8					100%
B+	57	51.9%	43	39.09%	10	9.09%
Total	110					100%
-B	8	88.8%	1	11.2%	0	0
Total	9					100%
AB+	18	40%	20	44.5%	7	15.5%
Total	45					100%
AB-	2	50%	2	50%	0	0
Total	4					100%
O+	80	45.9%	85	48.4%	10	5.7%
Total	174					100%
O-	7	38.8%	11	61.2%	0	0

Blood groups	Sex	Severity					

Table (4) The relation between gender and covid-19 severity according to ABO blood groups

		Mild		Moderate		Sever	
		No.	%	No.	%	No.	%

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A+	Males	22	31.5%	19	28.5%	4	**33.5%**
	females	47	68.5%	47	71.5%	8	**66.5%**
Total		69	100%	66	100%	12	**100%**
-A	Males	0	0	4	66.5%	0	**0**
	females	2	100%	2	33.5%	0	**0**
Total		2	100%	6	100%	0	**0**
B+	Males	16	29.5%	13	29.5%	4	**40%**
	females	39	70.5 %	31	70.5%	6	**60%**
Total		55	100%	44	100%	10	**100%**
-B	Males	4	50%	0	0	0	**0**
	females	4	50%	1	100%	0	**0**
Total		8	100%	1	100%	0	**0**
AB+	Males	5	27.7%	6	30%	0	
	females	13	72.3%	14	70%	6	**100%**
Total		18	100%	20	100%	6	**100%**
AB-	Males	1	50%	2	100%	0	**0**
	females	1	50%	0	0	0	**0**
Total		2	100%	2	100%	0	**0**
O+	Males	25	30.5%	29	37.6%	9	**90%**
	females	57	69.5%	48	62.4%	1	**10%**
Total		82	100%	77	100%	10	**100%**
O-	Males	1	10%	2	18.5%	0	**0**
	females	6	90%	9	81.5%	0	**0**
Total		7	100%	11	100%	0	**0**

Table (5) The relation between the age and covid 19 severity according to blood groups

Blood groups	**severity**	**Age (years)**											
		>20		20-29		30-39		40-49		50-59		**<60**	
A+	Mild	8	50 %	45	53%	7	30 %	6	46 %	1	12 %	1	**100 %**
	Moderate	8	50 %	31	36%	14	60 %	5	38 %	6	66 %	0	
	Sever	0	0	8	11%	2	10 %	2	16 %	2	22 %	0	
Total		16	100 %	84	100 %	23	100 %	13	100 %	9	100 %	1	**100 %**
A-	Mild	0	0	2	33.5 %	0	0	0		0	0	0	**0**
	Moderate	0	0	4	66.5 %	1	100 %	1	100 %	0	0	0	**0**

	Sever	0	0	0	0	0	0	0	0	0	0	0	**0**
Total		0	0	6	100 %	1	100 %	1	100 %	0	0	0	**0**
B+	Mild	3	50 %	32	64%	12	42 %	8	50 %	1	20 %	2	**50%**
	Moderate	3	50 %	16	32%	13	46 %	6	37 %	3	60 %	1	**25%**
	Sever	0	0	2	4%	3	10 %	2	13 %	1	20 %	1	**25%**
Total		6	100 %	50	100 %	28	100 %	16	100 %	5	100 %	4	**100 %**
B-	Mild	0	0	5	83.5 %	0	0	3	100 %	0	0	0	**0**
	Moderate	0	0	1	16.5 %	0	0	0	0	0	0	0	**0**
	Sever	0	0	0	0	0	0	0	0	0	0	0	**0**
Total		0	0	6	100 %	0	0	3	100 %	0	0	0	**0**
AB+	Mild	3	50 %	13	54%	2	40 %	0	0	0	0	0	**0**
	Moderate	3	50 %	10	41.5 %	0	0	5	71. 5%	1	100 %	1	**100 %**
	Sever	0	0	1	4.5 %	3	60 %	2	28. 5%	0	0	0	**0**
Total		6	100 %	24	100 %	5	100 %	7	100 %	1	100 %	1	**100 %**
AB-	Mild	0	0	2	50%	0	0	0	0	0	0	0	**0**
	Moderate	0	0	2	50%	0	0	0	0	0	0	0	**0**
	Sever	0	0	0	0	0	0	0	0	0	0	0	**0**
Total		0	0	4	100 %	0	0	0	0	0	0	0	**0**
O+	Mild	8	43 %	53	50%	7	33 %	5	42 %	3	30 %	2	**40%**
	Moderate	11	57 %	51	47%	12	57 %	6	50 %	4	40 %	3	**60%**
	Sever	0	0	4	3%	2	10 %	1	8%	3	30 %	0	**0**
Total		19	100 %	108	100	21	100 %	12	100 %	10	100 %	5	**100 %**
O-	Mild	2	40 %	3	50%	0	0	0	0	0	0	0	**0**
	Moderate	3	60 %	3	50%	2	100 %	4	100 %	0	0	0	**0**
	Sever	0	0	0	0	0	0	0	0	0	0	0	**0**
Total		5	100 %	6	100 %	2	100 %	4	100 %	0	0	0	**0**

Table (6) Signs and symptoms in relation to blood groups

Blood groups	Signs and symptoms	Mild		Moderate		Sever	
A+	Fever	39	18.5%	54	18%	11	13.7%
	Cough	15	7%	32	9%	8	10%

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	Dyspnea	12	5.7%	33	11%	8	10%
A-	Fever	10	58.8%	4	13%	0	0
	Cough	1	5.8%	4	13%	0	0
	Dyspnea	0	0	5	16.6%	0	0
B+	Fever	30	15%	34	15%	9	12%
	Cough	14	7.2%	23	10%	5	7%
	Dyspnea	9	4.6%	16	7%	8	11%
B-	Fever	1	7%	0	0	0	
	Cough	2	15%	0	0	0	
	Dyspnea	0	0	1	14%	0	
AB+	Fever	13	20%	17	17%	6	13%
	Cough	4	6%	8	8.3%	3	6%
	Dyspnea	3	4.6%	4	4%	3	6%
AB-	Fever	0	0	1	14%	0	0
	Cough	0	0	0	0	0	0
	Dyspnea	0	0	2	28%	0	0
O+	Fever	43	18%	68	16%	8	14%
	Cough	23	9.6%	46	11%	6	10%
	Dyspnea	13	5.4%	41	9%	8	14%
O-	Fever	7	18.9%	9	15%	0	0
	Cough	2	5.4%	4	6%	0	0
	Dyspnea	3	8%	5	8%	0	0

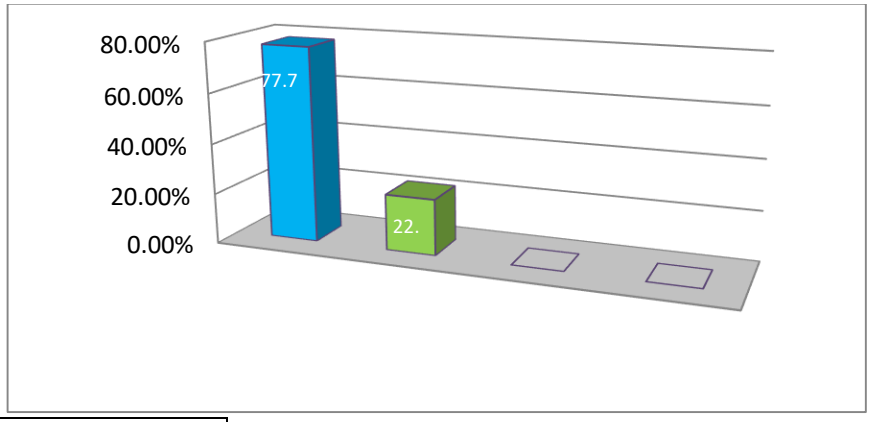

Figure (1) The outcome of covid19 patients

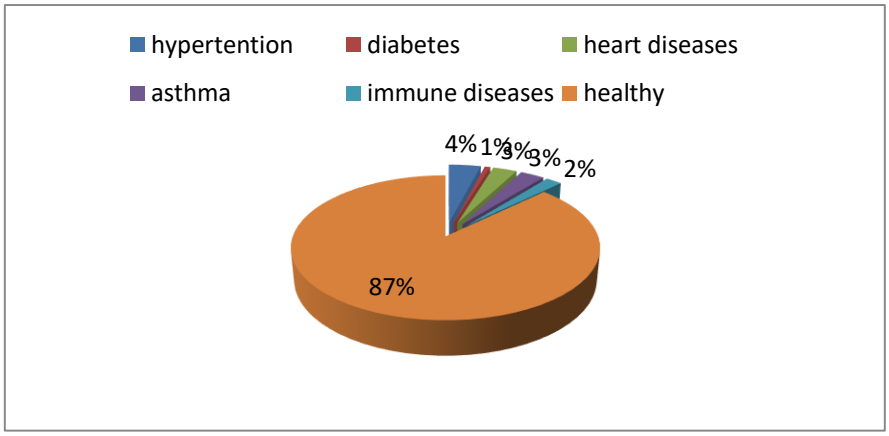

Figure (2) The relation between past medical history and covid19 infection.

5. Discussion

The present study included all patients with confirmed COVID19, ABO blood groups of 518 infected people in the current study, show the distribution as the following 176(34.1%) ,146(28.3%), 110(21.3%), 45(8.7%,),20(3.9%), 9(1.7%),8(1.6%),4(0.4%) for the O+, A+, B+, AB+, O-, B-, A- and AB- respectively. The proportion of blood group O+ in patient with COVID 19 was significantly higher than others group, these finding are consistent with similar risk patterns of ABO blood groups for other coronavirus infection found in another study for example a study done at Jinyintan hospital in Wuhan, Hubei province, China of 1,775 infected patient show distribution of 37.75%, 26.42%,10%and 25.8% for A,B,AB and O respectively. Another study show the association between the ABO blood groups and the susceptibility to acquire COVID-19 infection was confirmed in the group of blood donors. ABO blood groups were also associated to COVID-19 severity and mortality in the group of patients transfused during hospitalization. Therefore, blood groups A and O are two important factors to be considered when evaluating the prognosis of patients with COVID-19 [5], [6].

The mean age of patient 40(+/-20) years old the female were 67.5% the percentage of patient having BMI <18 was 2.1% while the BMI >25 was 44.2% in contrast to another study in which BMI < 18 was 12.9%, BMI > 25 was 31.3% [7]. The blood group O takes the highest frequency body weight, the main cause of that need to be more studied. O blood group prefers the high protein diet with lean meat and fish [8]. The severity of disease was higher for individuals with blood group A+ (8.1%) than blood group O+ (5.7%) and the lowest severity for blood groups were A-, B-, AB- and O-, other study published in ClinicaChimicaActa showed that the percentage of patients with type A+ in the covid-19 group was higher the blood type O+. This research showed that 97.8% of patients with covid-19 didn't require hospitalization, this study disagreed with other study done in America which showed that 68.4% of patients in their study required hospitalization and mechanical ventilation [9], [10]. About patient's past medical history, 87% don't suffer from any disease, but 4%, 3%,3%,2% and 1% suffer from hypertension, asthma, heart disease, immune disease and diabetes respectively. SAGE journals explained multiple contributing factors to the elevated risk of patients with chronic diseases [11]. Covid-19 infection among hypertensive patients complicated by myocardial infarction [12]. Regarding outcome of covid-19 patients, in this study 77.7% completely recovered and 22.3% still have some symptoms after recovery, compared with article from Geriatrics Department in Italy which found that patients who had recovered from COVID-19, 87.4% reported persistence of at least 1 symptom, particularly fatigue and dyspnea [13].

6. Conclusions

1-Infected patients had blood group O+,A+,B+,AB+,O-,B-,A- and AB- respectively from high to low

percentage.

2 -The severity of signs and symptoms was higher for individuals with blood group A+ (8.1%)

3- About 87% didn't have history of chronic diseases

4- Regarding of outcome in this study 77.7% completely recovered and 22.3% still have some symptoms after recovery.

Recommendations:

1. To the Ministry of Education in Iraq and to researchers throughout the world within their specialization: That this be a topic for their research in various places in Iraq and the world.
2. To the Ministry of Health should make an accurate electronic database counting so that researchers can benefit from it.

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