

Detection of anti rubella antibody among confirmed COVID-19 patients in comparison with their contact

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Abstract

Background: COVID-19 has great impact on the elderly and male population around the globe and the use of MMR vaccine may enhance the immune response of the persons against the disease. Objectives: The current study was applied to show anti rubella status among COVID-19 patients and their negative contacts. Methods: A comparative study included 50 patients with confirmed COVID-19 and 40 negative contacts were tested for the presence of anti-rubella antibody. Results: The results of this study showed that about (66%) of the patients were males while (34%) were females. Regarding anti rubella IgG status, it was shown that all COVID-19 positive patients were lacking the existence of antibody while (93%) of the contacts were positive for IgG anti rubella antibody. Conclusions: It is concluded that the lack of rubella antibody may be a risk to contract the disease, and its existence may be a protective factor even partially as trained immunity.

Key words: COVID-19, Immunity, Rubella, Kirkuk.

Introduction:

The great impact of COVID-19 on global population specifically affects the elderly group. In analyzing sequence homology, it was identified that 29% amino acid sequence homology between the Marco(CADP-ribose-1-phosphatase) of SARS-Cov-2 and Rubella virus, it was hypothesized that the outcome of age group lacking MMR-induced immunity was the worst; so it was expected that rubella status correlates with disease burden and outcome (1). Actually there are four corona virus genera (α , β , Y, S) with human corona virus (Hcovs) detected in α , β genera. It is a single strand positive sense genome (26-32 kb). Regarding the relation between the novel virus COVID-19 and Rubella; it is well known that rubella is one species of paramyxoviruses, and it was identified that corona sp shares a common core with F protein of paramyxovirus (2). In comparing the statistical data for measles coverage, COVID-19 cases and mortality rate between China and Italy, it was suggested that measles vaccine may provide partial protection against COVID-19 through two reasonable mechanisms, the first is that MV may increase the ability of immune system to fight pathogens other than measles due to new generation of bystander immunity and the second is COVID-19, has structural similarity with measles causing cross reactivity and immunity leading to partial protection (3). Objectives: - Detection of the Rubella antibody status in relation to symptoms and outcome of cases and their contacts of CovID-19 patients in Kirkuk.

Methodology:

1-Setting: The study was conducted in Kirkuk Health Sectors by passive surveillance of cases followed by active surveillance of contacts as a comparative group.

2-Duration: The study was continued for 2 months from first of June 2020 to end of July 2020.

3-Sample size: Regarding the case group all positive confirmed cases were included in the study; their contacts as 1:1 comparative samples were enrolled in the study (Random sample).

A total of 90 serum samples (50 confirmed COVID-19 patients matched with 40 contacts) were tested for the existence of antirubella Ab (IgG): 50 were confirmed COVID-19 patients and 40 were contacts with negative COVID-19. They were stratified according to age, gender and Rubella antibody status. The age of confirmed cases was ranging from 13-68 years, while the age of contact group was ranging from 6-64 years.

IgG anti-rubella virus is used to indicate the protective immunity against rubella virus. The test is used for detection of rubella virus antibody in human serum or plasma (CTK Biotech, Inc., San Diego, USA).

Results:

Table 1, shows among COVID-19 cases 33(66%) were males and 17(34%) were females. Concerning the age groups, the highest rate was 50-59 years old 12(24%) followed by 20-29 years old group 11(22%); 60 and over 9(18%); 30-39 years and 40-49 years 8(16%) for each; and the lowest was among below 10-19 years old 2(4%) group respectively.

Table 1. Distribution of COVID-19 PCR confirmed positive cases according to age and gender.

Age group	Males	Female	Total
>10-19	2	0	2(4%)
20-29	9	2	11(22%)
30-39	3	5	8(16%)
40-49	5	3	8(16%)
50-59	9	3	12(24%)
60->60	5	4	9(18%)
Total	33 (66%)	17 (34%)	50 (100%)

Table (2), shows the distribution of people among contact groups, the rate of males (75%) was higher than females (25%). The highest rate was among 30-39 years old (42.5%) followed by 20-29 years old (20%); 40-49 and 60 and over (15%) for each; below 10-19 years (5%) and the lowest was among 50-59 years old (2.5%) respectively.

Table 2. Distribution of COVID-19 contacts with negative PCR according to age and gender.

Age group	Males	Female	Total
>10-19	1	1	2 (5%)
20-29	6	2	8(20%)
30-39	13	4	17(42.5%)
40-49	3	3	6(15%)
50-59	1	0	1(2.5%)
60->60	6	0	6(15%)
Total	30 (75%)	10 (25%)	40 (100%)

Regarding the IgG anti rubella antibody, it was found that all COVID-19 positive case were negative to IgG anti rubella antibody, while among contact groups only 3 persons were negative (2 males and 1 female) for anti rubella antibody and the rest 37 persons were positive. Out of total 30 males 28(93%) were positive for anti rubella antibody, while in females 9 out of 10 (90%) were positive for ant rubella as indicated in table 3.

Table 3. Gender distribution of anti rubella IgG antibody among negative contacts.

Anti rubella IgG Antibody	Gender				Total
	Males	%	Females	%	
+ve	28	93	9	90	37
-ve	2	7	1	10	3
Total	30	100	10	100	40

Discussion:

Inflammation is regarded the first defense line that is coordinated in any event of tissue damage, in case of self-limiting inflammatory response there are four recognizable stages, the first being recognition of the infection where the innate immune system recognize a pathogen associated molecular pattern (PAMP) present in the invading micro-organism and there are receptors on the host known as pattern recognition receptors (PRR) of different categories that can recognize the microbe. Following the attachment several cytokines are introduced according to type of infection. The second stage is the recruitment following the recognition of the microbe. The host secretes cytokines, their role is to activate the migration of leukocytes to site of infection; the third stage is resolution, through which the resolution of the damage begins. The activation of cytokines lead to vasodilatation and permeability these inflammatory responses may lead to fever, nausea and anorexia. The final step in the process of inflammation is return to homeostasis; this step leads to be regulated to prevent cytokine storm by different responsible members such as IL-10 and transferring growth factor β (4).

It has been mention by (5) if rubella vaccination was successful, it would have high protective efficacy for various viral infections and it was assumed that any level of detectable

antibody to rubella virus is regarded as presumptive evidence of protective immunity. The current study showed that all (50) patients with confirmed COVID-19 had no rubella antibody in their serum, meaning that the absence of immunity against rubella may be a risk factor for contracting the infection.

Netea et al (6) had reported that infection is mild in the vast majority of cases and in minority it may progress into severe pneumonia and severe lung injury, due to initial defect in anti-viral host defense mechanism, and they presumed that long term boosting immunity (trained immunity) by live vaccine (measles, BCG, polio) may induce protection against infection and this may represent a principal tool for reducing susceptibility and severity for COVID-19.

In observing the results of table 2, it is clear that only 7.5% of the negative contacts may have many advantages, first being safe and highly efficient, genetically stable and does not have integration or recombination of genetic material. It was suggested that recombinant MV vaccine might be used to immunize population of SARS-cov outbreak.

It was hypothesized that humans are immunized against many viral diseases as mumps, rubella and other viruses, by inducing immunity against the invading viruses, so it is possible that the above mentioned viruses may share antigenetic epitops with spike protein of SARS-COV-2 leading to protect the vaccinated children from severe COVID-19 (8).

A clear example on the plausible opinion that MRCV vaccination had a highly protective role and reducing death rate was in a small country in Asia, Bhutan in which the entire population was vaccinated with the MRCV (adults and children) where the country recorded zero death from COVID-19 (9).

It was postulated that trained innate immunity may act against COVID-19 by increasing resistance to reinfection, resulting in that the innate immunity may remember the previous infections by cellular reprogramming (10).

Depending on the previously mentioned theories, any exposure to strong viral infections (antigens) may induce reprogramming events to improve the response to new inflammation (11).

Conclusions:

From the results of the current study it was concluded that anti-rubella antibody may have a crucial role in enhancing immunity against COVID-19, as female had lower infection rate than male, and the older had higher rate of infection than the young.

Recommendations:

Till the discovery of novel vaccine to combat COVID-19 and decline the spread of the disease, it is recommended to boost the immune of the susceptible individuals specially the male to fight the pandemic by protecting the adults by live vaccines like Rubella.

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