Does measles immunization lead to immunization for COVID-19? Case series

Mehmet Husamettin Akkucuk (1)
Nalan Akalın (2)
Betul Gulalp (3)

(1) Department of Emergency Medicine, Baskent University Alanya Research and Training Hospital, Antalya/Turkey
(2) Department of Biochemistry, Baskent University Alanya Research and Training Hospital, Antalya/Turkey
(3) Department of Emergency Medicine, Baskent University Adana Research and Training Hospital, Adana/Turkey

Corresponding author:
Dr. Mehmet Husamettin Akkucuk
Department of Emergency Medicine,
Baskent University Alanya Research and Training Hospital,
Antalya, Turkey
Email: hakkucuk@gmail. com

Received: November 2020; Accepted: December 2020; Published: January 1, 2021.
Citation: A Mehmet Husamettin Akkucuk, Nalan Akalın, Betul Gulalp. Does measles immunization lead to immunization for COVID-19? Case series. World Family Medicine. 2021; 19(1): 119-123 DOI: 10.5742/MEWFM.2021.93957

Abstract

There are many studies on protective, preventive and treatment methods for about Covid19 pandemic, which affects the whole world.The results of epidemiological studies also guide these researches. The studies of the scientists who are struggling with this pandemic worldwide reveal that the incidence of covid19 is low in the child age group and the disease survived more mildly in childhood. There is an opinion about the reason why covid 19 disease is seen less frequently and milder in pediatric patients, that active immunization created with childhood vaccines. For this reason, we compared the Rubeola immunoglobulin levels formed aganist the measles vector, one of the childhood vaccines which has antigenic similarity with the SARS-CoV family, in patients diagnosed with covid 19 in our hospital and Rubeola immunoglobulin levels of screening performed in healthy individuals before pandemi. As a result , we found the measles IgG levels were statistically significantly higher in patients diagnosed with measles IgG covid 19 compared to the control group. According to this result, this significant increase in level after being infected with SARS-CoV2 in patients with measles immunization may have positive effects on the course of the disease. In addition, we saw that all our Covid-19 patients with high measles antibody recovered without serious mortality and morbidity , despite their age, gender and chronic diseases. Therefore , considering the completion process of vaccination studies, we think that measles vaccination can be applied to risky groups without contraindications to reduce the existing destructive effects of the disease.

Key words: covid 19, measles IgG

Introduction

Many studies are being conducted to investigate the protective, preventive and therapeutic measures towards the COVID-19 pandemic. The results of the epidemiological studies also dominate these researches. The studies of the scientists who are struggling with this pandemic worldwide reveal that the incidence of COVID-19 is low in childhood and children who catch the disease usually experience a mild form (1). Although the immaturity of ACE-2 receptors that the virus uses for adhesion have been suggested to be the reason for asymptomatic cases in this age group (2), active immunization achieved through childhood vaccination is another potential cause (3).

First of the most striking examples about immunization is that COVID-19 was detected on the Diamond Princess cruise boat and 634 out of the 3,711 travelers and crew were found to be COVID-19 positive according to the results of the PCR test, and they were quarantined. Although most of the patients were in 60-80 year age group, the finding that 306 were asymptomatic and 328 were symptomatic (4) may be related to the recommendations of the World Health Organization (WHO) and Center for Disease Control (CDC) about the measles-mumps-rubella (MMR), varicella and tetanus vaccinations for boat travelers (5,6). Another example may be the low incidence of the disease among Syrian refugees potentially due to routine measles vaccination when entering our country. The aim of the present study was to investigate the potential positive effect of measles immunization in COVID-19 cases.

Materials and Methods

Study universe:
Cases diagnosed with COVID-19 through reverse transcriptase polymerase chain reaction (RT-PCR) at Başkent University Alanya Research and Training Center between March 11, 2020 and April 22, 2020 were included in the study.

Computed tomography (CT) of the chest was carried out on all patients except for children.

All patients had undergone the PCR test. A second PCR test had been performed 24 hours later for the patients whose first PCR test was negative and who fulfilled the diagnostic criteria of "probable case".

Antibody test was performed on day 5 of hospitalization for patients whose PCR test was negative twice and CT findings were consistent with viral pneumonia.

Exclusion criteria:
The patients who had positive tomography findings, but negative PCR and antibody tests, were excluded from the study.

Method:
The Rubeola IgG and IgM levels of the patients and the rubeola IgG levels of the health staff carried out for screening and who had been admitted to the immunization outpatient clinic in December 2019 as the control group, were compared. The total IgM and IgG titers, tomography findings, clinical findings and the prognosis of the patients were also evaluated.

Statistical Analysis
Descriptive statistics were used to present the mean ± Standard deviation (SD) or the median (range) for continuous variables, and the counts (percentages) for the categorical variables. Comparisons of the mean covid positive group and general control Rubeola IgG was made using the Mann-Whitney U-test for the independent samples. The data obtained in the study were analyzed statistically using the IBM SPSS statistics software version 25 (IBM Corp, USA). A two-sided value of $p < 0.05$ was accepted as statistically significant.

This study was approved by the Baskent University Institutional Review Board (Project no:KA20/176) and supported by the Baskent University Research Fund.

Results

The study included a total of 10 cases (Table 1). The mean age of the patients was 43.4 years (median 37); the mean value of the IgG titers was 32.2 ntu (median 33.95) (Table 2). Of the patients, 7 were female and 3 were male. While the COVID-19 PCR test was positive in 6, the PCR test was negative, but antibody test was positive in 4. All patients had been discharged with recovery. The IgM and IgG values were within normal ranges in all cases.

All cases in the control group were IgM sero-negative; IgG levels were below 30 ntu in 80% and the median value was 18.15. The rate of the values below 30 ntu was 30% in the COVID-19 group and the median value was found to be 33.95 (Table 3). The Rubeola IgG levels were found to be significantly higher in the COVID-19 group compared to the control group (Table 4).

Discussion

The results of the epidemiological and observational studies about COVID-19, which has led to a pandemic, and the severe mortality and morbidity worldwide have been shared. In a study from China, the rate of positivity was 2% in the 0-19 age group and 0.9% of these cases were below 10 years of age (7). The rate of childhood COVID-19 was reported as 1.2% in data from Italy in March 2020 and no mortality was reported (8). According to the USA 2020 March data, while the pediatric group comprised 5% of the patients, 1% required hospitalization (9). While 90% of the patients were asymptomatic, 5.2% had severe illness and 0.6% had critical illness in the largest case series from China (10). When the prevalence of the patients who had severe disease requiring critical care was evaluated, 10.6% were below 1 year of age, 7.3% were between ages 1 and 5, 4.2% were between 6 and 10, 4.1% were between 11 and 15, and 3% were between 16-17 years of age (10). Half of the patients who required critical care were below 1 year of age according to the same study. In another study including 171 cases, 3 children below 1 year of age (1.8%) needed intensive care and all three were seen to have co-morbid conditions (11). Based on the results of these studies, we may state that COVID-19 is either asymptomatic or mild in age groups where immunization is performed actively, particularly for measles, and the disease is more severe below 1 year of age when vaccination has just begun.

Experimental studies have revealed that immunization against measles with recombinant virus leads to antibody formation against hepatitis B, SIV (Simian immuno-deficiency virus), HIV (human immune deficiency virus) and the West Nile Virus encephalitis (13), and of these studies, the most significant study was that of M. Liniger et al. (2008), who demonstrated that mice infected with SARS-CoV induced high levels of neutralizing antibodies when vaccinated with live attenuated recombinant MV (measles) vaccine (13). Similarly, Walls et al. (2017) reported that trimeric trans-membrane spike (S) glycoprotein, which is responsible for receptor binding to host membranes and the fusion mediated S protein that is a fusion protein, initiated infection through promoting the fusion of viral and cellular membrane through forming a large crown on the virus surface. The authors also reported a significant similarity between the spike (S) protein of the corona virus and F protein, which is found in the paramyxovirus family, which also includes the measles virus, and it is the main target of neutralizing antibody in case of infection (14).

In our case series, all COVID-19 patients were discharged with recovery. In particular, contrary to our expectations, patients of 65 years and above, who had severe co-morbidity, did not experience morbidity and mortality (15). Two patients who did not demonstrate radiological evidence of the disease had been vaccinated against measles due to suspected contact and one of these patients was asymptomatic. In

	M/F	Age	PCR	Ig Rapid Test	R IgG (ntu)	Comorbidity	Tomography	Hospitalisation (Days)	ICU (Days)	MV	Covid-19 Contact	Measles Vaccination (In The Past Year)	Treatment	Result
1	M	85	(+)		35.1	COPD Hypertension	Bilateral Ground-glass	7	1	NIMV	(-)	(-)	Hydroxychloroqine Azithromycin	Cure
2	F	82	(+)		44.1	Rectum Cancer (Cure)	Bilateral Ground-glass	7	1	NIMV	(-)	(-)	Hydroxychloroqine Azithromycin	Cure
3	F	37	(+)		30.7	-	Unilateral Ground-glass	8	-	-	(-)	(-)	Hydroxychloroqine Azithromycin	Cure
4	F	33	(+)		24.7	-	Normal	5	-	-	(+)	(+)	Hydroxychloroqine Azithromycin	Cure
5	F	23	(+)		23.6	-	Normal	5	-	-	(+)	(-)	Hydroxychloroqine Azithromycin	Cure
6	F	4	(+)		46.7	-	Not CT scan	3	-	-	(+)	(-)	Hydroxychloroqine Azithromycin	Cure
7	M	44	(-)	(+)	34.5	-	Bilateral Ground-glass	11	-	-	(+)	(-)	Hydroxychloroqine Azithromycin	Cure
8	M	65	(-)	(+)	34.5	-	Bilateral Ground-glass	12	-	-	(+)	(-)	Hydroxychloroqine Azithromycin	Cure
9	F	24	(-)	(+)	12.4	-	Bilateral Ground-glass	7	-	-	(+)	(-)	Hydroxychloroqine Azithromycin	Cure
10	M	37	(-)	(+)	33.4	-	Normal	Without Hospitalisation	-	-	(+)	(+)	Azithromycin	Cure

Table 1

*M/F: Male/Female,
COPD: Chronic Obstructive Pulmonary Disease,
ntu: NovaTec Test Unit,
R IgG: Rubeola IgG,
Rubeola IgG cut of range 0-9 ntu,
NIMV: Non invasive Mechanic Ventilation,
ICU; Intensive Care Unit

Figure 1

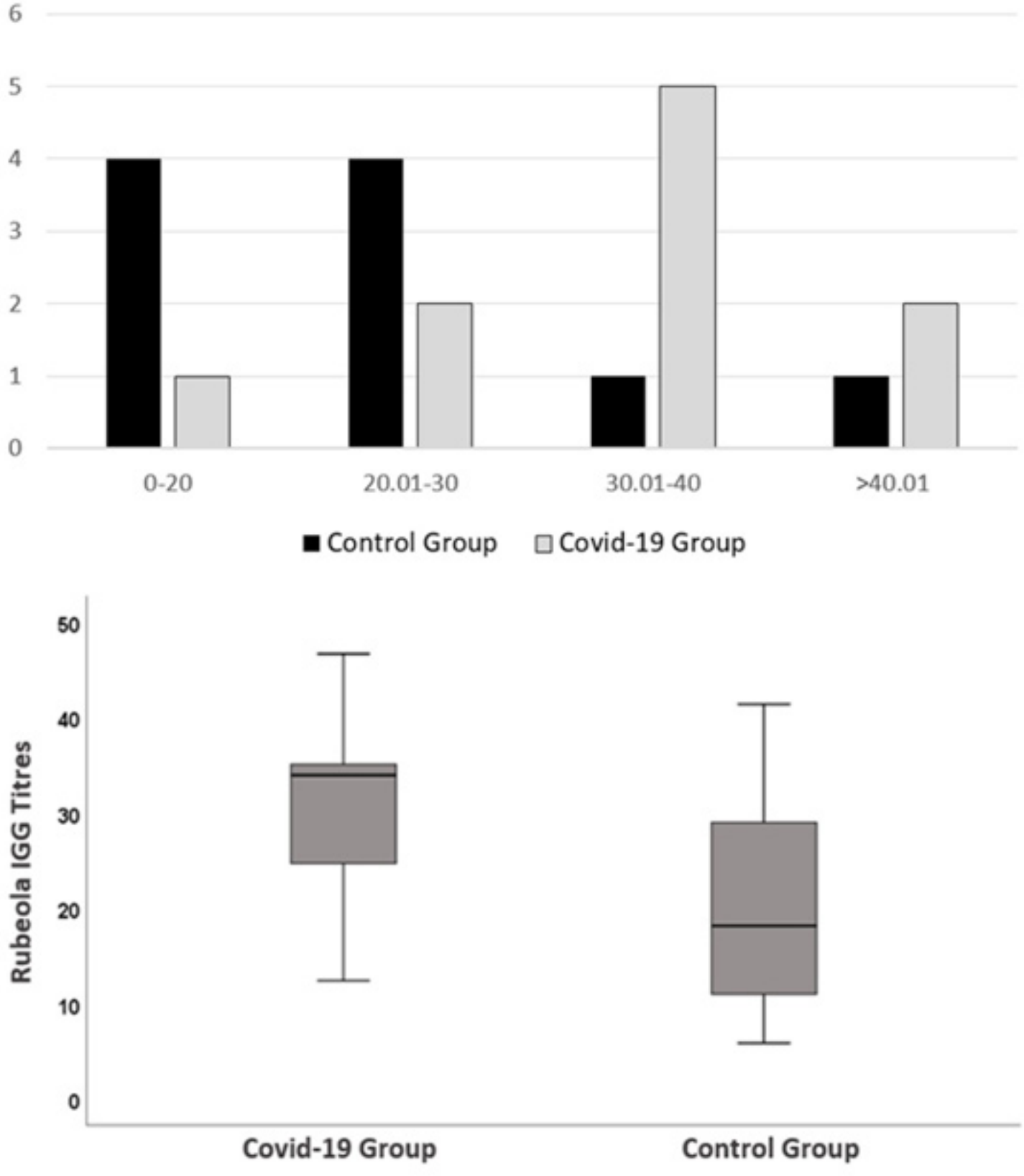
6
5
4
3
2
1
0
0-20
20.01-30
30.01-40
>40.01
Control Group
Covid-19 Group
Rubeola IGG Titres
50
40
30
20
10
0
Covid-19 Group
Control Group

Table 2

COVID CASE DESCRIPTIVE DATA						
	N	Mean	Median	sd	Minimum	Maximum
Covid Age	10	43,4	37.0	26,29	4	85
Covid IgG	10	32,24	33.95	9,97	12.40	46.70

Table 3

RUBEOLA IgG Titres Groups						
	N	Mean ±SD	Median	Min.- Max.	95% CI	p
Covid-19 Group	10	32,24 ± 9,97	33,95	12,40 - 46,70	25,10 - 39,37	0.043
Control Group	10	20,96 ± 11,70	18,15	5,86 - 41,40	12,53 - 29,40	

conclusion, detection of specific IgG with Rubeola IgM sero-negativity in all blood samples indicates that our patients had encountered measles naturally or through immunization, and they had immunization. Besides, there was no increase in the total IgM and IgG levels in any of the patients. This result suggests that total antibody response did not occur with cytokine storm or non-specifically, the Rubeola IgG levels increased against SARS-CoV-2 in COVID-19 patients. Therefore, we consider that Rubeola antibodies increase against SARS-CoV-2 with cross reaction, neutralize the SARS-CoV-2 and have positive effects in the course of the disease, as in the study of M. Liniger et al. (13). In order to support this opinion, studies may be planned with larger patient groups, in different stages of the disease, particularly in cases that result in morbidity and mortality. No specific treatment of COVID-19 has been reported in the literature yet. Based on the results of two patients vaccinated against measles within the recent two years, as in the examples of Syrian refugees and the cruise ship, and given the process of vaccination studies, we consider that the subjects with no contra-indication and those primarily in risky groups may be vaccinated against measles in order to reduce the destructive effects of the disease.

References

1. Ludvigsson JF. Systematicreview of COVID-19 in children shows milder case sand a beter prognosis than adults. Acta Paediatr. 2020 Mar 23. doi: 10.1111/apa.15270.
2. Lee PI, Hu YL, Chen PY, Huang YC, HsuehPR. Are children less susceptible to COVID-19? J Microbiol Immunol Infect. 2020 Feb 25. pii: S1684-1182(20)30039-6. doi: 10.1016/j.jmii.2020.02.011.
3. Ramazan Azim Okyay, Ahmet Riza Sahin, Rene A. Aguinada, Ali Muhittin Tasdogan. Why are Children Less Affected by COVID-19? Couldthere be an Overlooked Bacterial Co-Infection? EJMO 2020;4(1):104–105. DOI: 10.14744/emo.2020.40743
4. KenjiMizumoto, KatsushiKagaya, Alexander Zarebski, Gerardo Chowell. Estimating the asymptomatic proportion of coronavirus disease 2019 (COVID-19) cases on board the Diamond Princess cruise ship, Yokohama, Japan, 2020. Euro Surveill. 2020 Mar 12; 25(10): 2000180. doi: 10.2807/1560-7917.ES.2020.25.10.2000180
5. https://www.who.int/ith/vaccines/en/
6. https://wwwnc.cdc.gov/travel/page/cruise-ship
7. Zhang Y. The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020. Chinese Journal of Epidemiology (by The Novel Coronavirus Pneu monia Emergency Response Epidemiology Team) 2020
8. Livingston E, Bucher K. Coronavirus Disease 2019 (COVID-19) in Italy. Jama 2020 doi: 10.1001/jama.2020.4344 [published Online First: 2020/03/18]
9. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. (CDC COVID-19 Response Team). Morbidity and Mortality Weekly Report March 18, 2020 2020;69
10. Dong Y, Mo X, Hu Y, et al. Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. Pediatrics 2020;16:16. doi: https://dx.doi.org/10.1542/peds.2020-0702
11. Cui Y, Tian M, Huang D, et al. A 55-Day-Old Female Infant infected with COVID 19: presenting with pneumonia, liver injury, and heart damage. J InfectDis 2020;17:17. doi: https://dx.doi.org/10.1093/infdis/jiaa113
12. https://www.who.int/immunization/policy/Immunization_routine_table2.pdf?ua=1
13. Liniger M, Zuniga A, Tamin A, Azzouz-Morin TN, Knuchel M, Marty RR, Wiegand M, Weibel S, Kelvin D, Rota PA, Naim HY Induction of neutralising antibodies and cellular immune responses against SARS coronavirus by recombinant measles viruses. Vaccine. 2008 Apr 16;26(17):2164-74. doi: 10.1016/j.vaccine.2008.01.057. Epub 2008 Feb 22.
14. Alexandra C. Walls, M. Alejandra Tortorici, Joost Snijder, Xiaoli Xiong, Berend-Jan Bosch, Felix A. Rey, and David Veeslera, Tectonic conformational changes of a corona virus spike glycoprotein promote membrane fusion. ProcNatlAcadSci U S A. 2017 Oct 17; 114(42): 11157–11162
15. https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku