



Shadow of Measles and COVID-19 Outbreak; two related diseases: Opportunity Situation?

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Abstract

According to existing studies, evidence suggests the preventive effects of MMR (measles, mumps and rubella) vaccine on severity and infection of COVID-19, therefore paying attention to children's vaccination at the time of determination is very important. This vaccination should not be prevented because of fear of developing COVID-19 in health care centers.

Keywords: COVID-19, Coronavirus, SARS-Cov-2, Measles

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Measles is considered as an infection of the respiratory system caused by an RNA virus from the Paramyxoviridae family. Symptoms of measles include fever, cough, runny nose and skin rash on various parts of the body. Measles is transmitted through breathing and is highly contagious. The incubation period of measles is 14-17 days and can spread four days after the rash appears (1, 2). Measles as vaccine-preventable disease is one of the most acute diseases and is still a major cause of mortality among children, especially in malnourished children even in the 21st century (3, 4). Measles has a global spread and humans are the only hosts for this disease. Before the onset of the measles vaccine, measles epidemics occurred every 2-3 years, especially in winter and spring (5). The reproduction number for measles, based on the latest recorded epidemics, has been between 15 and 18 days, which indicates a much higher rate of transmission compared to the COVID-19. However, reproduction number for influenza was 1.5, which indicates relatively less transmission compared to the COVID-19. Although the reproduction number is generally used to assess and predict the rate of disease spread in the community (6,

7). The reproduction number for COVID-19 in various regions showed different figures e.g. in the Italian outbreak may range from 2.43 to 3.10 (8) or in China it was 2.24 to 3.58 (9). Knowledge of the reproduction number makes the need for the vaccine more clear. In the case of measles, which has an effective vaccine, public vaccinations in the community can prevent or control an epidemic by strengthening or compensating for herd immunity. To prevent or control measles pandemics, given a baseline number of 18, 94% of the population should be vaccinated in a general procedure, but for COVID-19, which is considered an emerging disease, the situation is not so simple at all. The disease is different from measles in three ways: (a) having an inhumane reservoir, (b) having a high percentage of susceptible individuals, and (c) not having an effective vaccine for all people (10,11). Infectious disease experts believe that, the not on time vaccinating children, during COVID-19 pandemic will push them to the new outbreak of measles. Therefore, they emphasize that measles, mumps, rubella (MMR) vaccination against the disease should not be delayed. However, some people think that the MMR

vaccine can cause side effects such as autism, encephalitis, meningitis, learning disabilities, and type I diabetes. As a result, the number of children who have been vaccinated has decreased (12). Pietrantonj et al in a meta-analysis revealed that one dose of the MMR vaccine has 95% efficacy in preventing measles. In general, studies have shown that measles, mumps, rubella, and varicella (MMRV) or MMR vaccines do not cause autism encephalitis or any other suspected side effects (11,12). There was, however, evidence of a low risk of febrile seizure following MMR vaccine (12). During the COVID-19 pandemic, vaccination against measles can reduce the risk and severity of COVID-19. Fidel et al stated that the administration of an unrelated live attenuated vaccine such as MMR may act as a preventive measure against the COVID-19. They also hypothesized that childhood vaccines have main role in low rate of COVID-19 in the children (13). Nevertheless, it is sophisticated to link MMR and COVID-19 that is why lots of vaccine such as polio and chickenpox are administrated in the childhood (14). There are some original published articles showing the effectiveness of MMR vaccine in the prevention of COVID-19. Gold et al showed that the titers of mumps associated with the MMR vaccine were significantly and inversely correlated with the severity of COVID-19-related symptoms. They showed, patients with titers between 134 and 300 arbitrary units (AU)/mL were asymptomatic. Patients with titers less than of 134 AU/mL had mild symptoms. Patients with titers less than of 75 AU/mL had moderate symptoms. Patients with titers less than of 32 AU/mL had severe symptoms and in some cases were hospitalized (15). In a study by Yengil et al in Turkey, MMR vaccination boosters, provided some degree of protection against COVID-19 infection in the adult population (16). In another study on 382 people, Larenas - Linnemann and Monroy found that MMR vaccine reduced the severity of COVID-19 while there was no need for supplemental oxygen (17). Yengil et al also showed that, non-vaccinated patients had higher rates of COVID-19 seropositivity compared to the vaccinated patients (40.6% versus 15.8%) and this difference was statistically significant (16-18). There is no doubt that various clinical randomized trials must be conducted to make final decision regarding the preventive effect of MMR vaccine. In Pakistan, the sudden downward trend in measles cases in 2020 (with COVID-19 pandemic) was concurrent with the COVID-19 peak compared to more measles rates in 2019 (without COVID-19 pandemic) (19).

Measles vaccine as base for COVID vaccine

Measles Protein Homology may contribute to cross-reactivity and activation protection, as a golden hallmark for drug discovery and development of COVID-19.

In summary, evidence suggests the preventive effects of MMR vaccine on severity and infection of COVID-19, hence paying attention to children's vaccination is very important.

Authors' contribution

Primary draft was prepared by TS, RH, and SF. NG, ND and TS edited the paper. PP conducted the final edit. All authors read and signed the final paper.

Conflicts of interest

The authors report no conflict of interests.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

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References

1. Perry RT, Halsey NA. The clinical significance of measles: a review. *J Infect Dis.* 2004; 189 Suppl 1:S4-16. doi: 10.1086/377712.
2. Rota PA, Featherstone DA, Bellini WJ. Molecular epidemiology of measles virus. *Curr Top Microbiol Immunol.* 2009;330:129-50. doi: 10.1007/978-3-540-70617-5_7.
3. Pike J, Melnick A, Gastañaduy PA, Kay M, Harbison J, Leidner AJ, et al. Societal Costs of a Measles Outbreak. *Pediatrics.* 2021;147:e2020027037. doi: 10.1542/peds.2020-027037
4. Muscat M, Bang H, Wohlfahrt J, Glismann S, Mølbak K. Measles in Europe: an epidemiological assessment. *Lancet.* 2009;373:383-9. doi: 10.1016/S0140-6736(08)61849-8.
5. Behrman RE, Kilgman RM. *Nelson Text book of Pediatrics*, Vol 1. 16th ed. Philadelphia: W.B. Saunders; 2000. p. 946-51.
6. Blackwood JC, Childs LM. An introduction to compartmental modeling for the budding infectious disease modeler. *Lett Biomath* 2018;5:195-221. doi: 10.1080/23737867.2018.1509026.
7. Giesecke J. *Modern infectious disease epidemiology.* 2nd ed. London: Arnold; 2002.
8. D'Arienzo M, Coniglio A. Assessment of the SARS-CoV-2 basic reproduction number, R0, based on the early phase of COVID-19 outbreak in Italy. *Biosaf Health.* 2020;2:57-59. doi: 10.1016/j.bshealth.2020.03.004.
9. Zhao S, Lin Q, Ran J, Musa SS, Yang G, Wang W, et al. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *Int J Infect Dis.* 2020;92:214-217. doi: 10.1016/j.ijid.2020.01.050.
10. Murdoch DR, French NP. COVID-19: another infectious disease emerging at the animal-human interface. *N Z Med J.* 2020;133:12-15.
11. Ahmed SF, Quadeer AA, McKay MR. Preliminary Identification of Potential Vaccine Targets for the COVID-19 Coronavirus (SARS-CoV-2) Based on SARS-CoV Immunological Studies. *Viruses.* 2020;12:254. doi: 10.3390/v12030254.
12. Di Pietrantonj C, Rivetti A, Marchione P, Debalini MG, Demicheli V. Vaccines for measles, mumps, rubella, and varicella in children. *Cochrane Database Syst Rev.* 2020;4:CD004407. doi: 10.1002/14651858.CD004407.
13. Fidel PL, Noverr MC. Could an unrelated live attenuated vaccine serve as a preventive measure to dampen septic inflammation associated with COVID-19 infection? *mBio.* 2020:e00907-20. doi:10.1128/mBio.00907-20.
14. Özdemir Ö. Measles-Mumps-Rubella Vaccine and COVID-19 Relationship. *Mbio.* 2020;11:e01832-20. doi: 10.1128/mBio.01832-20.
15. Gold JE, Baumgartl WH, Okyay RA, Licht WE, Fidel PL Jr, Noverr MC, et al. Analysis of Measles-Mumps-Rubella (MMR) Titers

- of Recovered COVID-19 Patients. *mBio*. 2020;11:e02628-20. doi: 10.1128/mBio.02628-20.
16. Yengil E, Onlen Y, Ozer C, Hambolat M, Ozdogan M. Effectiveness of Booster Measles-Mumps-Rubella Vaccination in Lower COVID-19 Infection Rates: A Retrospective Cohort Study in Turkish Adults. *Int J Gen Med*. 2021;14:1757-1762. doi: 10.2147/IJGM.S309022.
 17. Larenas - Linnemann D, Monroy FR. Recent mumps-measles-rubella vaccination probably reduces COVID-19 severity: a proposed strategy for close-contacts of patients. *J Allergy Clin Immunol*. 2021;147:AB246. doi: 10.1016/j.jaci.2020.12.041.
 18. Pironti C, Moccia G, Capunzo M, Motta O, De Caro F. Effect of lockdown for COVID-19 on aerodiffusive disease reduction, such as measles. *Epidemiol Prev*. 2020;44:318-320. doi: 10.19191/EP20.5-6.P318.004.
 19. Rana MS, Usman M, Alam MM, Mere MO, Ikram A, Zaidi SSZ, et al. Impact of COVID-19 pandemic on Measles surveillance in Pakistan. *J Infect*. 2021;82:414-451. doi: 10.1016/j.jinf.2020.10.008.