J Korean Med Sci. 2019 Feb 18;34(6):e59
https://doi.org/10.3346/jkms.2019.34.e59
eISSN 1598-6357·pISSN 1011-8934

JKMS

Opinion

Check for updates

The Measles Strikes Back

Jin Han Kang [1] **and Jin-Hong Yoo** [2]

[1]Department of Pediatrics, The Chief Director of Vaccine-Bio Research Institute, College of Medicine, The Catholic University of Korea, Seoul, Korea
[2]Department of Internal Medicine, College of Medicine, The Catholic University of Korea, Seoul, Korea

Address for Correspondence:
Jin-Hong Yoo, MD, PhD
Division of Infectious Diseases, Department of Internal Medicine, College of Medicine, The Catholic University of Korea, Seoul, Korea, Bucheon St. Mary's Hospital, 327 Sosa-ro, Bucheon 14647, Republic of Korea.
E-mail: jhyoo@catholic.ac.kr

ORCID iDs
Jin Han Kang
https://orcid.org/0000-0003-1610-6742
Jin-Hong Yoo
https://orcid.org/0000-0003-2611-3399

Disclosure
The authors have no potential conflicts of interest to disclose.

In Korea, large-scale measles catch-up vaccination was conducted on 5,860,000 children aged 8–16 years with low measles antibody levels through a measles immunodynamic study in 2001 because of a massive measles epidemic in 2000–2001. Since then, the measles-mumps-rubella (MMR) inoculation rate was maintained at 95% or more in children. And measles elimination was approved by World Health Organization in 2014 after a keep-up program to confirm MMR second vaccination before admission.[1]

However, as in other countries with high measles coverage rates, small-scale epidemics have been repeated in Korea since 2013. This was due to the import of measles from other countries. These events have also been reported in other countries where measles elimination has been confirmed.[2]

Even after the global high rate of measles vaccination has been maintained, the recurrence of small-scale epidemics has been attributed to factors such as vaccine cold chain handling issues, age-related vaccination policies, individual waning immunity or suboptimal immunity, and heavy exposure.[3]

Despite the high rate of measles vaccination, the common cause of measles epidemics is that measles neutralizing antibodies are reduced to less than protective immunity after more than 10 years after the second dose of measles vaccine. It is natural that they become vulnerable to measles if they are not given additional vaccination with low antibody. Therefore, there is a need for countermeasures against this problem.[4,5]

In a domestic study of this aspect, it was reported that immunity against measles was significantly lower in adolescents and young adults in their 20s.[6] These age groups were children who were vaccinated at the time of the catch-up vaccination policy in 2001 as a result of confirmation of waning immunity after the passage of time. This study reaffirmed that measles waning immunity differs from that seen with long-term immunity due to cell-mediated immunity after wild infection.[7] In countries where measles elimination is established solely based on measles vaccination, small measles epidemics will continue to occur in younger infants under the age of one who have not been vaccinated, and in aging populations with reduced defense immunity if a measles outbreak occurs in a foreign country.

What is the best control of measles outbreak in a country with high measles vaccine coverage?

In order to solve these problems, it is necessary to continuously carry out epidemiological studies on age-specific measles immunity in the countries concerned and to maintain the herd immunity by increasing the protection rate of population (PRP) by at least 93%. To achieve this, the claim that the immunity to measles should be increased through supplemented measles vaccination to the lower age group of PRPs should be reconsidered.[8] Especially, infants under one year of age should be checked for the maintenance period of maternal measles antibody, and the minimum vaccination age should be estimated in case of epidemic and should be reflected in the appropriate vaccination schedule in the future. In addition, quarantine should be strengthened, and the measles surveillance and genetic analysis system should be firmly maintained to quickly confirm the genetic information of measles virus introduced from foreign countries.[9]

In countries where measles vaccination rates are high, such as in Korea, infected patients are not classic, but instead have modified measles, which makes it difficult to diagnose early.[10] These patients can spread measles on a large scale. Therefore, strict isolation standards of measles should be applied at the time of the epidemic. Unvaccinated infants in the epidemic area should be vaccinated early and measles vaccination for unvaccinated young adults should be encouraged. In particular, in Korea, since the vaccination registration program has not been established in adults, their vaccination history cannot be known. Therefore, it is urgently necessary to develop an adult vaccination registration system in a short time.

Since the mid-1980s, vaccination policies have been very successful in Korea and most vaccine preventable diseases have been eliminated and well managed. However, in maintaining this condition, there is a tendency to show interest only when an outbreak occurs. In the current situation where measles elimination has been declared, it will be necessary to find and implement measures to continuously maintain the policy, and a method to maintain it, in consultation with experts.

REFERENCES

1. Choe YJ, Jee Y, Oh MD, Lee JK. Measles elimination activities in the Western Pacific Region: experience from the Republic of Korea. *J Korean Med Sci* 2015;30 (Suppl 2):S115-21.
   PUBMED | CROSSREF
2. Yang TU, Kim JW, Eom HE, Oh HK, Kim ES, Kang HJ, et al. Resurgence of measles in a country of elimination: interim assessment and current control measures in the Republic of Korea in early 2014. *Int J Infect Dis* 2015;33:12-4.
   PUBMED | CROSSREF
3. Seward JF, Orenstein WA. Editorial commentary: a rare event: a measles outbreak in a population with high 2-dose measles vaccine coverage. *Clin Infect Dis* 2012;55(3):403-5.
   PUBMED | CROSSREF
4. Nishiura H, Mizumoto K, Asai Y. Assessing the transmission dynamics of measles in Japan, 2016. *Epidemics* 2017;20:67-72.
   PUBMED | CROSSREF
5. Criffin DE. The immune response in measles: virus control, clearance and protective immunity. *Vaccine* 2016;8(10):282.
   PUBMED | CROSSREF
6. Kang HJ, Han YW, Kim SJ, Kim YJ, Kim AR, Kim JA, et al. An increasing, potentially measles-susceptible population over time after vaccination in Korea. *Vaccine* 2017;35(33):4126-32.
   PUBMED | CROSSREF
7. van Els CA, Nanan R. T cell responses in acute measles. *Viral Immunol* 2002;15(3):435-50.
   PUBMED | CROSSREF

https://doi.org/10.3346/jkms.2019.34.e59

8. Rovida F, Brianese N, Piralla A, Sarasini A, Girello A, Giardina F, et al. Outbreak of measles genotype H1 in Northern Italy originated from a case imported from Southeast Asia, 2017. *Clin Microbiol Infect* 2018:pii: S1198-743X(18)30764-X.
PUBMED | CROSSREF

9. Hu Y, Lu P, Deng X, Guo H, Zhou M. The declining antibody level of measles virus in China population, 2009-2015. *BMC Public Health* 2018;18(1):906-9.
PUBMED | CROSSREF

10. Mizumoto K, Kobayashi T, Chowell G. Transmission potential of modified measles during an outbreak, Japan, March–May 2018. *Euro Surveill* 2018;23(24).
PUBMED | CROSSREF