Infect Chemother. 2019 Mar;51(1):54-57
https://doi.org/10.3947/ic.2019.51.1.54
pISSN 2093-2340·eISSN 2092-6448

Infection & Chemotherapy

Brief Communication

Check for updates

Preliminary Report of Seroprevalence of Anti-Measles Immunoglobulin G among Healthcare Workers of 6 Teaching Hospitals of Daegu, Korea in 2019

Hyun-Ha Chang [1], Shin-Woo Kim [1], Ki Tae Kwon [2], Hye In Kim [3], Min Jung Kim [3], Seong Yeol Ryu [4], Hyun Ah Kim [4], Jian Hur [5], Hyun Hee Kwon [6], and Hyo-Lim Hong [6]

[1]Department of Internal Medicine, School of Medicine, Kyungpook National University, Kyungpook National University Hospital, Daegu, Korea
[2]Department of Internal Medicine, School of Medicine, Kyungpook National University, Kyungpook National University Chilgok Hospital, Daegu, Korea
[3]Department of Infectious Disease, Daegu Fatima Hospital, Daegu, Korea
[4]Department of Infectious Disease, Keimyung University Dongsan Medical Center, Daegu, Korea
[5]Department of Internal Medicine, Yeungnam University Medical Center, Daegu, Korea
[6]Department of Internal Medicine, Catholic University of Daegu School of Medicine, Daegu, Korea

OPEN ACCESS

Received: Feb 1, 2019
Accepted: Mar 3, 2019

Corresponding Author:
Hyun-Ha Chang, MD, PhD
Department of Internal Medicine, School of Medicine, Kyungpook National University, Kyungpook National University Hospital, 130, Dongdeok-ro, Jung-gu, Daegu 41944, Korea.
Tel: +82-53-200-6553
Fax: +82-53-424-5542
E-mail: changhha@knu.ac.kr

ORCID iDs
Hyun-Ha Chang
https://orcid.org/0000-0002-9405-2121
Shin-Woo Kim
https://orcid.org/0000-0002-3755-8249
Ki Tae Kwon
https://orcid.org/0000-0003-4666-0672
Hye In Kim
https://orcid.org/0000-0001-7162-4150

ABSTRACT

The measles outbreak in Daegu of January 2019 made 6 teaching hospitals' organization test the measles immunity of their healthcare workers (HCWs). We found that 6,935 (75.9%) of 9,132 HCWs tested seropositive for anti-measles immunoglobulin G (IgG), and seropositivity rate was very different between 6 hospitals (range, 59.9 – 93.1%). The seroprevelence was lowest in the age of twenties, but the rate was different between 6 hospitals (range 47.0 – 85.5%). Therefore, to prevent measles from spreading to HCWs, each hospital should make their own data periodically about anti-measles IgG seropositivity of their HCWs.

Keywords: Measles; Seroprevalence; Health personnel

Measles is known as a highly contagious vaccine-preventable disease. In Korea, a vaccination against the measles had been done since 1965. The measles, mumps, and rubella (MMR) vaccination to children was accelerated in South Korea as the National Immunization Programs (NIP) in 1985. Furthermore, a two-dose MMR vaccination schedule, which was introduced in 1997, contributed the decrement of measles among children and adults. Thanks to the national efforts to control measles, the World Health Organization declared that measles had been eliminated in South Korea in 2014 [1]. However, since 1996 outbreaks have occurred in nosocomial transmission after importation from overseas countries even in the situation in which 2-dose MMR vaccination coverage was over 95% [2, 3]. Previous reports suggested that measles susceptibility is potentially increasing because of waning levels of measles IgG with increasing time post-vaccination in general population and young Korean healthcare workers (HCWs) [4, 5]. However, there have been a few representative real-world data about the anti-measles IgG seropositive rate of Korean HCWs, even knowing anti-measles seropositive status of HCWs is thought as a minimum condition to keep each hospital operable in vaccine-preventable viral epidemics.

ic Infection & Chemotherapy

Min Jung Kim
https://orcid.org/0000-0002-2637-7979
Seong Yeol Ryu
https://orcid.org/0000-0002-6023-8550
Hyun Ah Kim
https://orcid.org/0000-0002-9125-7156
Jian Hur
https://orcid.org/0000-0003-3219-8368
Hyun Hee Kwon
https://orcid.org/0000-0002-8509-3968
Hyo-Lim Hong
https://orcid.org/0000-0003-2147-1381

Funding

Anti-measles IgG tests of HCWs in this study was supported by Public Health Division, Daegu Metropolitan City.

Conflict of Interest

No conflicts of interest.

Author Contributions

Conceptualization: HHC. Data curation: KTK, HIK, HAK, JH, HHK. Formal analysis: KTK, HIK, MJK, SYR, HAK, JH, HHK. Funding acquisition: SWK. Investigation: SWK, HIK, MJK, HLH. Methodology: HHC. Project administration: HHC. Resources: SWK, SYR, JH, HLH. Software: HHC. Supervision: SWK. Validation: KTK, HHK. Visualization: HHC. Writing - original draft: HHC. Writing - review & editing: HHC.

From December 2018 to January 2019, sixteen laboratories confirmed measles cases (8 children and 8 adult patients) occurred in Daegu, Korea, and 5 of 8 adult patients were HCWs of the same hospital. To prevent nosocomial transmission in the middle of measles outbreak, Daegu City financially supported the anti-measles IgG tests of 6 teaching hospitals' HCWs, and each hospital could complete vaccination of MMR for seronegative HCWs. From January 7, 2019 to January 23, 2019, 6 teaching hospitals in Daegu city had tested anti-measles IgG of patient-facing HCWs (such as physicians, residents, nurses in wards or outpatient clinics, *etc*.). Anti-measles IgG was detected using chemiluminescence immunoassay (LIAISON® Measles IgG, DiaSorin, Saluggia, Italy) on LIAISON® Analyzer system according to the manufacturer's instructions. Borderline or equivocal value of anti-measles IgG was treated as negative. About a quarter of HCWs (working in children's hospital and intensive care units) in hospital B was vaccinated twice with MMR during September 2018 to November 2018, these HCWs were excluded in this serological study. Chi-square or Fisher's exact tests were used to analyze the categorical variables. A *P* value less than 0.05 was considered statistically significant. R version 3.3.2 was used for the all statistical analysis. The study was approved by the Institutional Review Board of the Kyungpook National University Hospital (Technical opinion number: KNUH 2019-01-037).

The seroprevalence of anti-measles IgG was analyzed in a total of 9,132 HCWs among 6 teaching hospitals, and the seropositive rate was 75.9% (**Table 1**). The proportion of HCWs who were seronegative to measles was lowest in 20 - 29 year-old HCWs (n = 1,346, 40.1%) and highest in over fifty year-old HCWs (**Table 1**); this trend was observed in all hospitals (**Fig. 1** and **2**). In the hospital A and B, the proportions of seropositivity in twenties of HCWs (81.9% and 85.5%, respectively) were statistically higher than those of hospital C to F (47.0 - 57.1%) (*P* <0.0001). (**Fig. 2**). It could be because hospital A and B had made a temporary financial support for MMR to women HCWs who wanted MMR in 2001 to 2002 due to measles outbreak in 2000-2001 in Korea, and some colleges of nursing have a policy of MMR and varicella vaccinations before nursing practicum. It is possible that these vaccine policies of 2 hospitals made these differences in the proportion of anti-measles seropositivity especially in young age groups, compared to other hospitals. Hospital D had a temporary policy that the new HCWs should get MMR before starting their work in 2007 to 2015. However, other hospitals (C, E, and F) didn't have any specified policy about MMR.

According to Adult immunization schedule recommendation by Korean Society of Infectious Diseases in 2017 and 2012, all HCWs was recommended to get MMR vaccinations before starting their duties as a HCW [6]. However, this recommendation could be thought not to have been executed appropriately, due to financial problem (about 24,000 KRW \ [~22 USD] per person), lack of knowledge, and other causes, *etc*. In the clinical field, it is very important for the managers of hospital including infection control team to know the seropositivity rate

Table 1. The number (%) of positive anti-measles immunoglobulin G rates of healthcare workers by the hospital and age group, Daegu, Korea, 2019

Hospital	Total No. of tested HCWs	Number (%) of positive anti-measles IgG according to the age group					Total Positivity (%)
		20–29 years	30–39 years	40–49 years	50–59 years	≥60 years	
A	1,534	393 (81.9)	423 (93.2)	330 (96.8)	229 (99.1)	27 (96.4)	91.4
B	1,113	254 (85.5)	445 (89.0)	166 (93.3)	112 (91.8)	15 (93.8)	89.1
C	1,411	319 (55.6)	178 (73.9)	288 (86.5)	218 (92.0)	25 (96.2)	72.9
D	1,684	342 (47.0)	280 (70.7)	244 (77.5)	178 (83.6)	31 (93.9)	63.8
E	1,867	416 (57.1)	347 (79.0)	308 (80.4)	243 (84.4)	24 (85.7)	71.7
F	1,523	288 (52.3)	314 (76.2)	270 (87.4)	228 (90.8)	0 (0.0)	72.2
Total	9,132	2,012 (59.9)	1,987 (81.4)	1,606 (86.4)	1,208 (90.0)	122 (93.1)	75.9

HCWs, healthcare workers; IgG, immunoglobulin G.

https://doi.org/10.3947/ic.2019.51.1.54

ic Infection & Chemotherapy

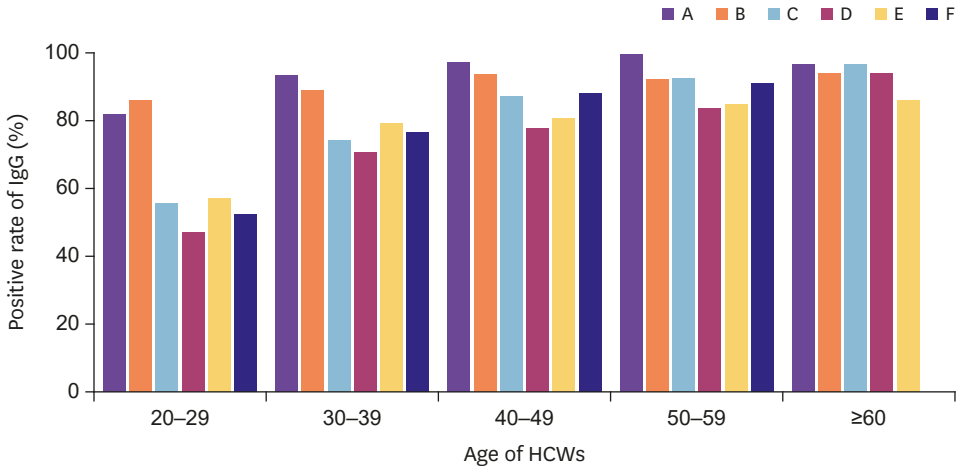

Figure 1. Different rate of positivity of 6 hospitals' healthcare workers according to the age distribution.
HCWs, healthcare workers; IgG, immunoglobulin G.

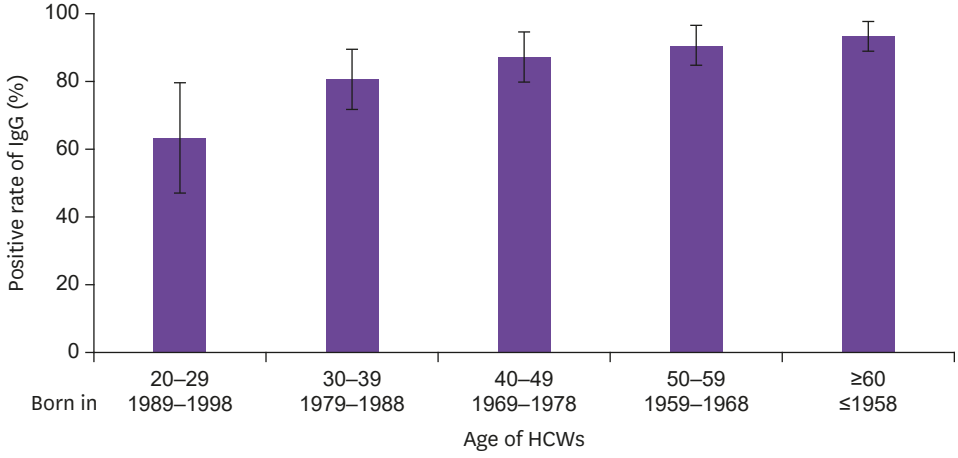

Figure 2. Average rate and 95% confidence intervals of seropositivity of total healthcare workers according to the age distribution.
HCWs, healthcare workers; IgG, immunoglobulin G.

of HCWs in each hospital, establish a budget for serologic tests and vaccinations, and deploy staff to more or less exposable parts to measles according to their serologic status. First, our report just shows preliminary results about the seropositivity of part of HCWs, not total employees of each hospital, because Daegu City supported only the cost of serologic tests of HCWs making direct contacts with patients (physicians and nurses). Second, the precise MMR vaccination histories of each HCW were not included in this study. However, the total number of enrolled HCWs in this study is larger than other previous domestic and foreign reports [4, 7, 8], and the very short period (<14 days) during which the serologic test results had been done could help to exclude other confounding factors like immune-potentiation by unexpected natural exposure to virus.

In summary, our result, as a previous suggestion by Kim et al. [4], supports that the routine MMR vaccination or serologic screening about measles should be required before entering the path of a HCW career in young Korean HCWs. To prevent nosocomial spread of measles to susceptible people, each hospital should get information about the status of protective antibody of their employees and make their own data periodically about anti-measles IgG seropositivity

https://doi.org/10.3947/ic.2019.51.1.54

of their HCWs. Furthermore, these strategies should be expanded to other epidemic viral diseases, such as varicella, to which HCWs are at an increased risk of being exposed.

ACKNOWLEDGEMENTS

We thank the staff of Public Health Division, Daegu Metropolitan City and Daegu Center for Infectious Diseases Control and Prevention for all their support.

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. Choi WS, Sniadack DH, Jee Y, Go UY, So JS, Cho H, Bae GR, Lee DH, Kim K, Yoon HS, Chung YS, Kang C, Park H, Park O, Lee JK. Outbreak of measles in the Republic of Korea, 2007: importance of nosocomial transmission. J Infect Dis 2011;204 (Suppl 1):S483-90.
PUBMED | CROSSREF
3. Yang TU, Kim JW, Eom HE, Oh HK, Kim ES, Kang HJ, Nam JG, Kim KS, Kim SS, Lee CK, Park YJ, Park O. 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
4. Kim SK, Park HY, Kim SH. A third dose of measles vaccine is needed in young Korean health care workers. Vaccine 2018;36:3888-9.
PUBMED | CROSSREF
5. Kang HJ, Han YW, Kim SJ, Kim YJ, Kim AR, Kim JA, Jung HD, Eom HE, Park O, Kim SS. An increasing, potentially measles-susceptible population over time after vaccination in Korea. Vaccine 2017;35:4126-32.
PUBMED | CROSSREF
6. Korean Society of Infectious Diseases (KSID). The Adult immunization schedule recommendation 2012 and 2017. Available at: http://www.ksid.or.kr/data/sub07.html. Accessed January 25 2019.
7. Kumakura S, Shibata H, Onoda K, Nishimura N, Matsuda C, Hirose M. Seroprevalence survey on measles, mumps, rubella and varicella antibodies in healthcare workers in Japan: sex, age, occupational-related differences and vaccine efficacy. Epidemiol Infect 2014;142:12-9.
PUBMED
8. Bakri FG, Abdelrahim ZM, Alkalbani AS, Khrais GM, Shamroukh DS, Hayajneh FA, Mahafza A. Seroprevalence of measles, mumps, rubella, and varicella amongphysicians and nurses in Jordan. Turk J Med Sci 2016;46:614-9.
PUBMED | CROSSREF