Background: Because there is limited recent information on this topic, this study investigated the seroprevalence of anti-hepatitis A virus (HAV) immunoglobulin G (IgG) in the South Korean population in 2015–2017.

Methods: Anti-HAV IgG seroprevalence data were obtained from the laboratory information system of Green Cross Laboratories, one of the largest referral laboratories in South Korea.

Results: During the three-year study period, we obtained test results from 240,840 individuals (124,353 men and 116,487 women) from 1,348 hospitals and local clinics throughout South Korea. The median (range) age of subjects was 38.0 (18.0–97.2) years. The annual seroprevalence of anti-HAV IgG was 53.3, 53.0, and 53.1% in 2015, 2016, and 2017, respectively. The median age differed among geographic regions and anti-HAV seroprevalence differed among age groups and geographic regions (P < 0.0001). Subjects in their 20’s had a significantly lower rate of anti-HAV IgG-positivity than subjects in their 10’s (odds ratio, 0.74, 95% CI, 0.69–0.78, P < 0.0001), while other age groups had higher rates. Multivariable-adjusted logistic regression analysis showed that women and subjects living in Incheon, Sejong city, Gangwon province, Gwangju, and North Jeolla province were more likely to be immune to HAV compared to subjects living in Seoul (OR > 1.0, P < 0.05).

Conclusions: This study provides basic information about the recent seroprevalence of anti-HAV IgG in the Korean population and contributes to identifying groups at high risk of an HAV epidemic.

Key Words: Hepatitis A, Seroepidemiologic studies, Korea, Hepatitis A antibodies

INTRODUCTION

Hepatitis A infection caused by the hepatitis A virus (HAV) is a global health concern, with an estimated 1.5 million people infected annually [1]. Although HAV infection is usually a self-limited illness that does not become chronic, fulminant hepatitis may develop, for which liver transplantation may also be required [1, 2]. Globally, acute HAV caused 52,000 deaths in 1980–2016 [2]. The population incidence of HAV infection is related to socioeconomic factors including housing density, sanitation, water quality, and income [1, 3]. HAV infection confers lifelong immunity and is preventable via vaccination; the so-called “paradox of hepatitis A risk” refers to the fact that a high seroprevalence of anti-HAV IgG antibodies reflects high endemicity, meaning high levels of population immunity [1].

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In recent years, HAV seropositivity among young adults in South Korea has decreased owing to improved general hygiene and economic status [3]. The HAV seropositivity was above 80% in teenagers during the 1970s in South Korea but had decreased to less than 20% in 2007, highlighting a rapid decline in immunity against HAV [3, 4]. In South Korea, the HAV vaccine was first introduced in 1997 and has been recommended for high-risk groups; it is currently recommended for children over 12 months of age [5]. Although HAV vaccination was introduced in South Korea more than 20 years ago, the reported infection incident rates in 2017 were 8-9 patients per 100,000 population [3, 6]. Because there is little information about the more recent seroprevalence of anti-HAV IgG in South Korea [3, 6], this study retrospectively analyzed seroprevalence from 2015 to 2017.

**MATERIALS AND METHODS**

1. **Study populations**
   Anti-HAV IgG Seroprevalence data from January 2015 to December 2017 were obtained from the laboratory information system of Green Cross Laboratories, one of the largest referral laboratories in South Korea that provides clinical sample analysis services to 1,348 hospitals and local clinics nationwide. We analyzed the seroprevalence data of all adults (>18 years) who visited hospitals or local clinics and underwent serum anti-HAV IgG tests by Green Cross Laboratories during the study period. Duplicated test results were excluded. The subjects were categorized into age groups by decade and all data were anonymized before analysis. This study was conducted according to the principles of the Declaration of Helsinki and all procedures involving human subjects were approved by the Institutional Review Board of Green Cross Laboratories (GCL-2018-1010-01). This study involved no more than minimal risk to the subjects and the Institutional Review Board of Green Cross Laboratories waived informed consent for the retrospective data collection and review.

2. **Analytical procedures**
   Serum anti-HAV IgG tests were performed by chemiluminescence microparticle immunoassay (CMIA; Abbott, USA) on an Architector i2000 analyzer (Abbott, Singapore) according to the manufacturer’s instructions. The resulting chemiluminescent reactions were measured as relative light units (RLU). CMIA test positivity was defined as a serum anti-HAV IgG level ≥1.00 S/CO (sample RLU/cut-off RLU). Positive anti-HAV IgG tests were considered ‘immune’ to HAV (representing either past HAV infection or vaccination) [1].

3. **Statistical analysis**
   Statistical analysis was performed using MedCalc software for Windows, version 179.7 (MedCalc Software, Ostend, Belgium) and OpenEpi software, version 3.01 (www.openepi.com). Seroprevalence and disease burden were compared among age groups, sexes, and geographical regions. To compare the seroprevalence of anti-HAV IgG among geographic regions by population density in 2015 based on data from the KOrean Statistical Information Service (KOSIS) [7], Seoul, Gyeonggi province, Incheon, Daejeon, Ulsan, Daegu, Busan, and Gwangju were categorized as density group 1 (population density over 1,000 persons/km²); the other regions were categorized as density group 2 (population density <1,000 persons/km²). Geographic regions were also categorized into three groups based on their populations in 2015 [7] as follows: group 1, >10% of the total Korean population (Seoul and Gyeonggi province); group 2, 5–10% of the total Korean population (Incheon, North and South Gyeongsang provinces, and Busan); and group 3, <5% of the total Korean population (the other regions). Differences in seroprevalence between categorical variables were analyzed by Chi-square tests, while continuous variables were compared by analysis of variance (ANOVA). Multivariable-adjusted logistic regression analysis was performed to evaluate variables associated with HAV immunity (anti-HAV IgG-positive). P-values <0.05 were considered statistically significant.

4. **Data availability**
   The datasets generated during and/or analyzed during the current study are not publicly available due to restrictions in data sharing but are available from the corresponding author on reasonable request.

**RESULTS**

During the three-year study period, we obtained anti-HAV IgG test results from 240,840 individuals (124,353 men and 116,487 women). The median (range) age was 38.0 (18.0–97.2) years. The annual anti-HAV IgG seroprevalence in 2015, 2016, and 2017 was
Table 1. Age- and sex-stratified anti-hepatitis A virus immunoglobulin G (HAV IgG) results (numbers and percentages) in Korean adults, 2015–2017

| Sex   | Age (yr) | 2015 Total | 2016 Total | 2017 Total | 2015–2017 Total |
|-------|----------|------------|------------|------------|-----------------|
|       |          | Positive   | %Positive  | Positive   | %Positive       | Positive   | %Positive |
|       |          |            |            |            |                 |            |           |
| Men   | 18–19    | 1,323      | 248        | 1,300      | 218            | 1,283      | 100       |
|       |          | 360        | 27.3       | 581        | 36.8           | 581        | 36.8      |
|       | 20–29    | 4,279      | 1,007      | 6,371      | 1,627          | 9,578      | 31.3      |
|       |          | 235        | 25.5       | 27.5       | 27.5           | 27.5       | 27.5      |
|       | 30–39    | 8,234      | 2,699      | 15,513     | 4,602          | 17,117     | 26.5      |
|       |          | 328        | 29.7       | 31.7       | 31.7           | 31.7       | 31.7      |
|       | 40–49    | 9,246      | 7,124      | 15,229     | 10,935         | 16,164     | 68.0      |
|       |          | 77.0       | 71.8       | 71.8       | 71.8           | 71.8       | 71.8      |
|       | 50–59    | 6,247      | 6,086      | 7,999      | 7,697          | 15,735     | 96.0      |
|       |          | 97.4       | 96.2       | 96.2       | 96.2           | 96.2       | 96.2      |
|       | 60–69    | 2,294      | 2,292      | 2,805      | 2,799          | 5,640      | 99.8      |
|       |          | 99.9       | 99.8       | 99.8       | 99.8           | 99.8       | 99.8      |
|       | 70–79    | 897        | 894        | 893        | 890            | 1,786      | 99.7      |
|       |          | 99.7       | 99.7       | 99.7       | 99.7           | 99.7       | 99.7      |
|       | 80–89    | 154        | 154        | 151        | 150            | 302        | 99.3      |
|       |          | 100        | 100        | 100        | 100            | 100        | 100       |
|       | ≥ 90     | 6          | 6          | 3          | 3              | 9          | 100       |
| Men total | 32,678  | 20,622     | 33,248     | 35,544     | 29,284         | 124,353    | 58.3      |
| Women  | 18–19    | 1,123      | 248        | 1,100      | 218            | 1,091      | 100       |
|       |          | 22.1       | 21.7       | 21.7       | 21.7           | 21.7       | 21.7      |
|       | 20–29    | 8,495      | 1,682      | 8,054      | 1,744          | 9,616      | 22.7      |
|       |          | 19.8       | 21.7       | 21.7       | 21.7           | 21.7       | 21.7      |
|       | 30–39    | 18,178     | 5,653      | 18,771     | 6,191          | 24,962     | 32.1      |
|       |          | 31.1       | 33.0       | 33.0       | 33.0           | 33.0       | 33.0      |
|       | 40–49    | 6,025      | 4,732      | 7,944      | 5,720          | 13,866     | 90.0      |
|       |          | 78.5       | 72.0       | 72.0       | 72.0           | 72.0       | 72.0      |
|       | 50–59    | 3,663      | 3,582      | 3,351      | 3,453          | 6,714      | 97.0      |
|       |          | 98.7       | 97.0       | 97.0       | 97.0           | 97.0       | 97.0      |
|       | 60–69    | 1,283      | 1,280      | 1,313      | 1,310          | 2,623      | 99.8      |
|       |          | 99.8       | 99.8       | 99.8       | 99.8           | 99.8       | 99.8      |
|       | 70–79    | 535        | 533        | 427        | 424            | 854        | 99.3      |
|       |          | 99.6       | 99.3       | 99.3       | 99.3           | 99.3       | 99.3      |
|       | 80–89    | 111        | 111        | 70         | 69             | 181        | 98.6      |
|       |          | 100        | 98.6       | 98.6       | 98.6           | 98.6       | 98.6      |
|       | ≥ 90     | 10         | 9          | 4          | 4              | 14         | 100       |
| Women total | 39,423  | 17,830     | 47,253     | 50,959     | 44,789         | 95,748     | 54.0      |
| Both   | Total    | 71,101     | 38,452     | 110,581    | 95,807         | 206,388    | 53.1      |

53.3%, 53.0%, and 53.1%, respectively (Table 1). Factors associated with positive anti-HAV IgG results were analyzed (Table 2). We observed differences in seroprevalence by sex (men 59.4% vs. women 46.4%, P < 0.0001). The age-related seroprevalence of anti-HAV IgG was lowest in subjects in their 20s (Fig. 1). Anti-HAV IgG antibody seroprevalence was also evaluated by geographic region in Korea. Different numbers of subjects living in different geographic regions were tested during the study period. Among the 240,840 anti-HAV IgG test results, 50.8% were from Gyeonggi province.

Subjects living in Jeju (anti-HAV IgG positivity rate: 37.0%) were the most susceptible to HAV infection. The median age of subjects differed significantly among geographic regions (data not shown). The seroprevalence of anti-HAV IgG among geographic regions according to KOSIS population density [7] is shown in Table 3. A higher anti-HAV IgG positivity rate (53.6%) was observed in density group 1 regions (population density over 1,000 persons/km²) than that in density group 2 regions (48.9%, < 1,000 persons/km², P < 0.0001). According to geographic regions based on population proportions, the anti-HAV positivity rates in population proportion groups 1 (43.8% of the total Korean population), 2 (24.2% of the total Korean population), and 3 (32.0% of the total Korean population) were 53.4%, 56.3%, and 48.9%, respectively (P < 0.0001).

Logistic regression analysis to investigate the factors associated with HAV immune status (Table 2) showed that the odds ratios (ORs) for HAV immunity were lower in women than in men; subjects in their 20's than those in their 10's; and subjects living in Sejong city, North and South Chungcheong provinces, Daegu, and Jeju province than in subjects living in Seoul (ORs < 1.00, P < 0.001). However, multivariable-adjusted logistic regression analysis showed that the OR for HAV immunity was higher in women than that in men (OR 1.04, 95% confidence interval [CI], 1.02–1.06, P < 0.0001). Multivariable-adjusted logistic regression analysis also showed a significantly lower rate of anti-HAV IgG positivity in 2016 and 2017 compared to that in 2015. After adjusting for age, sex, and years tested, subjects living in Sejong city showed a higher rate of anti-HAV IgG positivity than subjects living in Seoul, contrary to the results of the univariable logistic regression analysis. Subjects living in Incheon, Sejong city, Gangwon, Gwangju, and North Jeolla provinces had higher ORs for HAV immunity than subjects living in Seoul (OR > 1.00, P < 0.05).

Previous studies on HAV seroprevalence performed in general
Table 2. Factors associated with positive anti-hepatitis A virus immunoglobulin G (HAV IgG) results in 240,840 Korean subjects*

|                      | Total  | Positive | % Positive | Univariable logistic regression OR 95% CI P-value | Multivariable logistic regression OR 95% CI P-value |
|----------------------|--------|----------|------------|---------------------------------------------|---------------------------------------------|
| **Sex**              |        |          |            |                                             |                                             |
| Men                  | 124,353| 73,891   | 59.4       |                                             |                                             |
| Women                | 116,487| 54,096   | 46.4       |                                             |                                             |
| **Test year**        |        |          |            |                                             |                                             |
| 2015                 | 72,101 | 38,452   | 53.3       |                                             |                                             |
| 2016                 | 91,509 | 48,507   | 53.0       |                                             |                                             |
| 2017                 | 77,230 | 41,028   | 53.1       |                                             |                                             |
| **Age group (yr)**   |        |          |            |                                             |                                             |
| 18–19                | 6,298  | 1,943    | 30.9       |                                             |                                             |
| 20–29                | 39,496 | 9,335    | 23.6       |                                             |                                             |
| 30–39                | 88,916 | 27,537   | 31.0       |                                             |                                             |
| 40–49                | 57,110 | 41,278   | 72.3       |                                             |                                             |
| 50–59                | 32,358 | 31,277   | 96.7       |                                             |                                             |
| 60–69                | 2,850  | 1,996    | 54.4       |                                             |                                             |
| 70–79                | 4,033  | 3,705    | 92.4       |                                             |                                             |
| ≥90                  | 48     | 47       | 97.9       |                                             |                                             |
| **Geographic regions**|       |          |            |                                             |                                             |
| Seoul                | 42,885 | 22,115   | 51.6       |                                             |                                             |
| Gyeonggi Province     | 122,413| 66,122   | 54.0       |                                             |                                             |
| Incheon              | 30,495 | 17,380   | 57.0       |                                             |                                             |
| Daejeon              | 9,569  | 4,885    | 51.1       |                                             |                                             |
| Sejong City          | 3,875  | 1,520    | 39.2       |                                             |                                             |
| North Chungcheong Province | 2,850 | 1,282    | 45.0       |                                             |                                             |
| South Chungcheong Province | 4,850 | 1,996    | 41.2       |                                             |                                             |
| Gangwon Province      | 1,947  | 1,203    | 62.8       |                                             |                                             |
| Ulsan                | 583    | 337      | 59.9       |                                             |                                             |
| Daegu                | 5,492  | 2,956    | 54.1       |                                             |                                             |
| North Gyeongsang Province | 1,888 | 1,005    | 53.2       |                                             |                                             |
| South Gyeongsang Province | 1,247 | 678      | 54.4       |                                             |                                             |
| Busan                | 4,152  | 2,204    | 53.1       |                                             |                                             |
| Gwangju              | 2,208  | 1,361    | 61.6       |                                             |                                             |
| North Jeolla Province | 4,926  | 2,952    | 59.9       |                                             |                                             |
| South Jeolla Province | 445    | 268      | 60.2       |                                             |                                             |
| Jeju Province         | 1,035  | 383      | 37.0       |                                             |                                             |

*Data are not presented when P-values > 0.05.
Abbreviations: CI, confidence interval; OR, odds ratio.

populations throughout Korea and studies that included more than 10,000 subjects since 2005 are summarized in Table 4. Koreans in their 10s and 20s were the most likely groups to contract HAV infections in 2005–2017. The anti-HAV IgG seroprevalence in Koreans in their 30s decreased from 50.7–71.7% before 2010 [5, 8-10] to 31.0% during 2015–2017.

**DISCUSSION**

This study evaluated the annual anti-HAV IgG seroprevalence in the Korean adult population between 2015 and 2017. The strength of this study is its large, nationwide population. Thus, investigating the current seroprevalence of anti-HAV IgG and the disease burden of hepatitis A will aid in efforts for infection prevention and control [3].

Seroepidemiologic changes were evaluated through a review of previous studies performed in Korea with more than 10,000 subjects and those performed in various geographic regions (Table 4). The previous studies summarized in Table 4 were performed by assessing total anti-HAV antibodies (including IgG and IgM),
unlike the present study. Differences in analytical methods might have affected the seroprevalence of the specific study population. However, since 2005, Koreans in their 10s and 20s were the most likely to be infected with HAV. Of note, more Koreans in their 30s are currently at high risk of HAV infection. The seropositivity of anti-HAV decreased from 2005 to 2017. This finding was similar to that reported in Thailand, in which the seroprevalence among 21–30-year-olds decreased from 84.9% in 1991 to 35.8% in 2007 and 17% in 2016 [11]. A study in Beijing, China, reported anti-HAV positivity rates in the general population of 68.23%, 81.73%, and 82.47%, respectively, in 1992, 2006, and 2014 [12]. The seroprevalence among 20–29-year-olds was 78.24–81.60% in 1992, 72.31–63.77% in 2006, and 70.63–75.89% in 2014 [12]. Another study performed in Shijiazhuang prefecture, China, reported a seroprevalence among 20–29-year-olds of 80% and a coverage rate in the target population above 99% after integration of the hepatitis A vaccine into the Expanded Program on Immunization [13].

Serological surveillance is an important tool for the evaluation
of vaccination programs and avoids the limitations of passive disease reporting systems [14]. Because this study provides basic information on the seroprevalence of anti-HAV IgG in the Korean population, it contributes to identifying groups at high risk for an HAV epidemic in Korea. Specifically, Koreans in their 20s, 30s, and 40s are at increased risk for hepatitis A and should be identified and vaccinated [3, 5]. Despite the availability of the HAV vaccine in South Korea since 1997, vaccination of children only started in 2015 and the rate of catch-up vaccinations for young adults remains low due to high cost and low levels of knowledge and awareness [3]. An immunity gap in young adults and an epidemiologic transition cannot be ignored when formulating public health policies [15]. Therefore, a hepatitis A immunization program to promote catch-up vaccinations for young adults and an active public campaign regarding young adult vaccination are needed in South Korea [3].

More than half of the positive results in this study were from Gyeonggi province, which includes the capital area of South Korea and about 23.7% of the total Korean population [7]. In early 2007, the South Korean government created a special administrative district—‘Sejong city’—from parts of the South Chungcheong and North Chungcheong provinces, near Daejeon, to relocate nine ministries and four national agencies from Seoul. The median age of the subjects differed significantly among geographic regions in this study. This might have affected the seroprevalences in different regions. In this study, fewer than 1,000 subjects were tested for anti-HAV IgG in the Ulsan and South Jeolla provinces, which could have affected the observed anti-HAV IgG seropositivity. Additional studies are needed to determine the effects of regional differences in various factors including health awareness and government programs for encouraging public health on anti-HAV IgG seropositivity.

One limitation of this study was the lack of clinical information, including detailed history, physical examination, other laboratory and image studies associated with HAV infection, and disease severity, which were substantially omitted from the seroprevalence and image studies associated with HAV infection, and disease severity, which were substantially omitted from the seroprevalence reports. As a result, preliminary diagnoses or misdiagnoses may obfuscate the true incidence of hepatitis A in South Korea. Nevertheless, anti-HAV IgG is a well-known marker of the epidemiologic status of population immunity and this study provides valu-

### Table 3. Hepatitis A seroprevalence among geographic regions in Korea

| Geographic regions                | Population in 2015, Korea [7] | anti-HAV IgG test results | Population density group | Population number group |
|-----------------------------------|-------------------------------|---------------------------|--------------------------|-------------------------|
|                                  | Density person/km² | Numbers | Total | Positive | 95% Confidence limit |                                  |                                  |
|                                  | N   | %     | N   | %     | Lower | Upper |                                  |                                  |
| Total                            | 509.2 | 51,069,375 | 100 | 240,840 | 127,987 | 53.1 | 52.9 | 53.3 |                                  |                                  |
| Seoul                             | 16,364.0 | 9,904,312 | 19.4 | 42,885 | 22,115 | 51.6 | 51.1 | 52.0 | 1 | 1 |                                  |                                  |
| Gyeonggi Province                 | 12,264.0 | 12,479,061 | 9.4 | 122,413 | 66,122 | 54.0 | 53.7 | 54.3 | 1 | 1 |                                  |                                  |
| Incheon                          | 7,555.5 | 2,890,451 | 5.7 | 30,495 | 17,380 | 57.0 | 56.4 | 57.6 | 1 | 2 |                                  |                                  |
| Daejeon                          | 2,852.3 | 1,538,394 | 3.0 | 9,569 | 4,885 | 51.1 | 50.1 | 52.1 | 1 | 3 |                                  |                                  |
| Sejong City                      | 439.0 | 204,088 | 0.4 | 3,875 | 1,520 | 39.2 | 37.7 | 40.8 | 1 | 3 |                                  |                                  |
| North Chungcheong Province        | 214.6 | 1,589,347 | 3.1 | 2,850 | 1,282 | 45.0 | 43.2 | 46.8 | 2 | 3 |                                  |                                  |
| South Chungcheong Province        | 256.6 | 2,107,802 | 4.1 | 4,850 | 1,996 | 41.2 | 39.8 | 42.6 | 2 | 3 |                                  |                                  |
| Gangwon Province                  | 90.2 | 1,518,040 | 3.0 | 1,947 | 1,203 | 67.8 | 59.6 | 63.9 | 2 | 3 |                                  |                                  |
| Ulsan                             | 1,099.6 | 1,166,615 | 2.3 | 563 | 337 | 59.9 | 55.8 | 63.8 | 1 | 3 |                                  |                                  |
| Daegu                             | 1,899.0 | 1,246,052 | 4.8 | 5,492 | 2,296 | 41.8 | 40.5 | 43.1 | 1 | 3 |                                  |                                  |
| North Gyeongsang Province         | 140.8 | 2,680,294 | 5.2 | 1,888 | 1,005 | 53.2 | 51.0 | 55.5 | 2 | 2 |                                  |                                  |
| South Gyeongsang Province         | 316.4 | 3,334,524 | 6.5 | 1,247 | 678 | 54.4 | 51.6 | 57.1 | 2 | 2 |                                  |                                  |
| Busan                             | 4,479.9 | 3,448,717 | 6.8 | 4,152 | 2,204 | 53.1 | 51.6 | 54.6 | 1 | 2 |                                  |                                  |
| Gwangju                           | 969.8 | 1,502,881 | 2.9 | 2,206 | 1,361 | 61.1 | 60.0 | 63.7 | 1 | 3 |                                  |                                  |
| North Jeolla Province             | 227.4 | 1,834,114 | 3.6 | 4,926 | 2,952 | 59.9 | 58.6 | 61.3 | 2 | 3 |                                  |                                  |
| South Jeolla Province             | 146.1 | 1,799,044 | 3.5 | 445 | 268 | 60.2 | 55.6 | 64.7 | 2 | 3 |                                  |                                  |
| Jeju Province                     | 327.5 | 605,619 | 1.2 | 1,035 | 383 | 37.0 | 34.1 | 40.0 | 2 | 3 |                                  |                                  |

*Adjusted for population number. †Geographic regions with population densities over 1,000 persons/km² (group 1) and < 1,000 persons/km² (group 2). A higher anti-HAV IgG positivity rate was observed in density group 1 regions than that in density group 2 regions (53.6% vs 48.9%, P < 0.0001). ‡Geographic regions with population number > 10% of the total Korean population (group 1: Seoul and Gyeonggi province), 5–10% of the total Korean population (group 2: Incheon, North and South Gyeongsang provinces, and Busan), and < 5% of the total Korean population (group 3: other regions). Anti-HAV positivity rates in population proportion group 1, group 2, and group 3 were 53.4%, 56.3%, and 48.9%, respectively (P < 0.0001).
Table 4. Hepatitis A seroprevalence studies in Korea

| Reference | Study year | Serologic study | Analytical method Region | Age (yr) | Total | Positive | % | Total | Positive | % |
|-----------|------------|-----------------|--------------------------|----------|-------|---------|---|-------|---------|---|
| Lee et al. [8] | 2005-2008 | anti-HAV (total) | Elecsys Modular analytics E170 (Roche) | Throughout Korea | 11,068 | 6,951 | 62.8 | 25,140 | 13,052 | 51.9 |
| Lee et al. [9] | 2005-2009 | anti-HAV (total) | Elecsys Modular analytics E170 (Roche) | Throughout Korea | 25,140 | 13,052 | 51.9 | 1,872 | 1,008 | 53.8 |
| Lee et al. [5] | 2008-2010 | anti-HAV (total) | Elecsys Modular analytics E170 (Roche) | Throughout Korea | 1,872 | 1,008 | 53.8 | 810 | 514 | 63.5 |

| Reference | Study year | Serologic study | Analytical method Region | Age (yr) | Total | Positive | % | Total | Positive | % |
|-----------|------------|-----------------|--------------------------|----------|-------|---------|---|-------|---------|---|
| Cho et al. [10] | 2009–2010 | anti-HAV (total) | ADVIA Centaur (Siemens) | Throughout Korea | 56,623 | 28,843 | 50.9 | 11,177 | 7,719 | 69.1 |
| Yoon et al. [3] | 2010–2014 | anti-HAV (total) | Not reported | Seoul | 240,840 | 80,811 | 53.1 | 6,298 | 1,946 | 30.9 |
| This study | 2015–2017 | anti-HAV IgG | CMIA on an Architect i2000 analyzer (Abbott) | Throughout Korea | 6,298 | 1,946 | 30.9 | 39,496 | 9,335 | 23.6 |

*Detailed information including numbers tested by age group are not reported in the literature. † Data are expressed as ≥ 40 years. ‡ ≥ 50 years. § ≥ 60 years. ‡≥ 70 years.

Abbreviation: HAV, hepatitis A virus.

In conclusion, hepatitis A seroprevalence has been relatively low in the Korean adult population in recent years. Young adults (10s-30s) are especially at risk for an HAV epidemic and should be identified and vaccinated. This study provides valuable information for establishing a catch-up vaccination program in South Korea; however, additional studies on long-term changes in seroprevalence in patient populations are needed.
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