

# 수막구균 수막염의 인식, 감염병에 대한 일반 지식 및 예방접종 현황: 국내외 대학 재학생 비교 연구

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## Awareness, Knowledge, and Vaccination Status of Meningococcal Meningitis Vaccination: A Comparative Study on International and Korean University Students

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**Background:** Meningococcal meningitis is a disease that can cause severe and possibly fatal side effects. To prevent the spread of meningococcal meningitis, which is a highly transmissible disease, 16 states in the USA mandate entering college students to receive meningococcal vaccination. Nevertheless, South Korea does not. This study aims to point out the importance of meningococcal vaccination by comparing the level of general knowledge and recognition of the requirement for vaccination among university students in the USA/Canada and Korea.

**Methods:** The study was conducted using a self-filled questionnaire survey targeting international and Korean students at one of Korea's universities. The survey focused on topics such as knowledge of infectious diseases that can occur at the dormitory residence, infectious agents and routes of meningococcal meningitis infection and infection route, and students' intention to receive meningococcal vaccination.

**Results:** International university students had a higher awareness of the importance of infectious disease prevention than Korean students ( $P<0.05$ ) and also had higher meningococcal-related knowledge ( $P<0.05$ ). International universities strongly recommend meningococcal vaccination compared to Korean universities ( $P<0.05$ ), and the actual vaccination rate was higher than that of domestic university students ( $P<0.05$ ).

**Conclusions:** This study found that the awareness of meningococcal vaccination among Korean university students was lower than that of international university students, and the vaccination rate was also lower. Because students often do not get vaccinated due to low awareness of the meningococcal disease, health education programs can increase their knowledge about infectious diseases and awareness of vaccines. Thus, increasing the vaccination rate.

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## INTRODUCTION

*Neisseria meningitidis* meningococcus is a gram-negative bacterium that can cause acute infectious diseases such as meningitis and sepsis.<sup>1)</sup> It spreads through respiratory drop-

lets, respiratory secretions or human contacts, and close contact increases the transmission risk. Therefore, patient investigation, contact monitoring, and prophylactic antibiotic administration are essential for infectious diseases. The mortality rate due to meningococcal infection is up to 10% in developed countries and is higher in developing countries.<sup>2)</sup> The disease can cause permanent sequelae from complications even if the infected person is treated for the disease. It is an infectious disease with severe after-effects that require strong prevention.<sup>3)</sup>

When analyzing the frequency of adult meningitis according to the cause in Korea, the most common was aseptic, followed by tuberculosis, and the third most common was bacterial. Bacterial meningitis accounts for about 20% of all meningitis.<sup>4)</sup>

Meningitis is an inflammation in the meninges close to the brain caused by infections from viruses, bacteria, fungi, or parasites. Viral meningitis is mild in its process and can naturally heal within a few days. On the other hand, bacterial meningitis causes around a 20% mortality rate and is known to leave severe sequelae.<sup>5)</sup> The most common infectious strain of bacterial meningitis is *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis*. Meningitis due to the bacteria has decreased because of the influenza vaccination. It is speculated to have caused meningococcal meningitis to increase in proportion in the bacterial meningitis spectrum. Bacterial meningitis is a severe disease with an average of 1 in 10 deaths and 1 in 5 permanent sequelae despite apt treatment.<sup>6)</sup> Therefore, primary prevention is essential.<sup>7)</sup> One study states that 500,000 new meningococcal meningitis cases occur worldwide, and 50,000 of them die.<sup>8)</sup> Even in developed countries, meningococcal meningitis has an incidence of 0.5-4 per 100,000 people.<sup>9)</sup> In the United States, about 3,000 cases of meningococcal meningitis occur each year.<sup>10)</sup> Although it is estimated that more than a hundred cases of meningococcal meningitis occur in Korea annually, only 100 cases were reported from 2002 to 2011.<sup>9)</sup> However, the incidence of meningococcal infection in Korea is estimated to be higher than that.

Infants and young children are the most common age group for meningococcal meningitis, which is thought to be due to incomplete immunity.<sup>11)</sup> The next group is youth or university dormitory students, who are more active and exposed to group life. In other words, it is a disease that can develop sufficiently even in a normally healthy person.

According to the World Health Organization 1 in 10 people worldwide are an asymptomatic carrier of meningococcus in the back of the throat and nostrils.<sup>12)</sup> Meningococcus, which can be easily exposed in daily life, is usually transmitted through the saliva of carriers and can also be transmitted through daily contacts such as sharing tableware and kissing. It is also known that smoking and drinking alcohol can increase the risk of meningococcal infection.

Due to the severity and transmission potential of meningococcal meningitis, meningococcal vaccination is already mandatory in 16 states in the United States. In addition, certain states in the United States have mandated that all freshmen entering college get vaccinated against meningococcus. The meningococcal vaccine is also recommended for first-year college students in the UK.

In Korea, the meningococcal vaccine is not included in the mandatory vaccination for infants and toddlers, and the vaccination was started in 2012 only for soldiers at military boot camps.<sup>13)</sup> In addition, the Korean Society of Infectious Diseases recommends vaccination against meningococcus as a high-risk group for college freshmen living in dormitories after 2021 adult immunization schedule.<sup>14)</sup>

Meningococcus is mainly observed among adolescents ageing between 15 and 20. This is because that age group considered a change of residence period due to college or military entry.<sup>15)</sup>

Despite the potential risk of meningococcal, which is the focus of this study, vaccination for adults such as dormitory resident is insignificant and awareness of the meningococcal vaccine is also low. In this regard, this study aims to review the importance of the meningococcal vaccine and its current status.

Therefore, this study investigated the general knowledge about meningococcal meningitis and the need for vaccination among university dormitory students and university faculty and staff to identify differences in perceptions between domestic and foreign countries and determine the meningococcal meningitis vaccine in domestic group living subjects. In addition, the need for inoculation was reviewed.

## METHODS

### 1. Study objects and period

The subjects of the survey were faculty and staff currently working on dormitory students at domestic and foreign uni-

versities, as well as college students or graduate students who currently live in dormitories or plan to enter the university within the next 6 months. One thousand eighty-eight students were surveyed, conducted from February 2014 to May 2014, with 874 domestic university students and 214 students from foreign universities (located in the United States and Canada).

## 2. Survey questions

In general, the contents of the questionnaire were about the perception of infectious diseases that can occur while living in the dormitory, the perception of meningococcal meningitis, the recognition of the infectious agent and route of meningococcal meningitis, the perception of the possibility of meningococcal meningitis treatment, and the in-

tention to vaccinate. It was investigated by self-completion. The survey was done through a 'self-complete' survey.

## 3. Analysis method

The data collected in this study were analyzed using the R software (version 4.0.3) statistical program (The R Foundation for Statistical Computing, Vienna, Austria). Awareness of meningococcal meningitis was calculated by frequency and percentage and was analyzed by chi-squared test and analysis of variance. A 95% confidence interval (CI) of the incidence was calculated. The statistical significance level was 0.05.

**Table 1.** Characteristic of studies

	Domestic (n=874)	Foreign (n=214)	P
Sex			
Male	343 (39.2)	110 (51.4)	0.002 <sup>a</sup>
Female	531 (60.8)	104 (48.6)	0.002 <sup>a</sup>
Age, y	20.6±1.8	22.1±3.1	0.002 <sup>a</sup>
Campus accommodation			0.003 <sup>a</sup>
Planned residence			
Less than 1 year	60 (6.9)	26 (12.2)	
1 year-less than 2 years	339 (38.8)	65 (30.4)	
2 years-less than 3 years	329 (37.6)	51 (23.8)	
3 years-less than 4 years	72 (8.2)	39 (18.2)	
4 years or longer	62 (7.1)	22 (10.3)	
12 (1.4)		11 (5.1)	
University-recommended vaccination			<0.001 <sup>b</sup>
Yes	133 (15.2)	207 (96.7)	
No	725 (83.0)	7 (3.3)	
Non-respondents	16 (1.8)	0 (0.0)	
Actual inoculated vaccination			<0.001 <sup>b</sup>
Yes	71 (8.12)	201 (93.93)	
No	803 (91.88)	13 (6.07)	
Recognition of the importance of preventing infectious disease			<0.001 <sup>b</sup>
Yes	163 (18.6)	149 (69.6)	
No	692 (79.2)	58 (27.1)	
Non-respondents	19 (2.2)	7 (3.3)	
Meningococcal awareness			<0.001 <sup>b</sup>
Yes	232 (26.5)	144 (67.3)	
No	642 (73.5)	70 (32.7)	

Values are presented as mean±standard deviation or number (%).

<sup>a</sup>P<0.01.

<sup>b</sup>P<0.001.

#### 4. Ethical consideration

The study was approved by the Soonchunhyang University Institutional Review Board (202107-SB-072-03). The questionnaires were completed anonymously.

## RESULTS

### 1. General characteristics of the study subjects

In order to compare the perception of meningococcal meningitis vaccination in Korea and abroad, 874 domestic students and faculty members, and 214 overseas students and faculty members were included in this survey. The average age of the domestic subjects was  $20.6 \pm 1.8$  years, and the overseas subjects were  $22.1 \pm 3.1$ , having no significant differences between the groups (Table 1).

With regards to dormitory residence, 60 people (6.9%) plan to enter dormitories within the next 6 months, and 814 people (93.1%) currently reside in dormitories in Korea. On the other hand, 26 people (12.2%) are expected to enter dormitories abroad, and 188 people (87.8%) are current dormitory residents.

Requests for vaccination before entering the university dormitory were 15.2% in Korea and 96.7% overseas ( $P < 0.05$ ), suggesting that overseas universities have a more active role in requiring vaccination than domestic universities. On the other hand, 8.2% of domestic and 93.9% of overseas students answered that they had received the vaccine before ad-

mission, and statistically significant differences were found in whether or not domestic and overseas students were vaccinated ( $P < 0.05$ ).

The 18.6% of domestic students and 69.6% of foreign students showed an understanding of the importance of infectious disease prevention in dormitory life, showing foreign university students have a better perception rate of the importance ( $P < 0.05$ ). As for the bacteria of our interest, meningococcus perception, 26.5% of domestic and 67.3% of foreign students were aware of it. Showing that foreign students have a better perception rate of meningococcus ( $P < 0.05$ ).

### 2. Perception of infectious disease in dormitory life

When living in a group such as a dormitory, the awareness of the importance of preventing infectious diseases was 18.6% in Korea and 69.6% overseas, with a higher awareness rate of preventing infectious diseases abroad than in Korea ( $P < 0.05$ ) (Table 2).

As a result of the students' awareness of how to prevent infectious diseases, 48.4% of domestic students answered with 'maintaining a clean life such as washing hands.' Except for 15.1% who did not respond, the following answers were scored: 'vaccination' followed by 16.5%, 'regular health check-up' by 13.4%, 'balanced diet' by 8.7%, 'take nutritional supplements such as vitamins' by 3.7%, 'do not share food with personal items' was at 2.7%. On the other hand, foreign students, excluding the 4.7% who did not respond, answered as follows: 'vaccination' 34.6%, 'maintaining a clean

**Table 2.** Recognition of Infection disease

	Domestic (n=874)	Foreign (n=214)	P
Recognition of infectious diseases			<0.001 <sup>a</sup>
Yes	163 (18.6)	149 (69.6)	
No	692 (79.2)	58 (27.1)	
Non-respondents	19 (2.2)	7 (3.3)	
Preventive methods			
Maintaining a clean life style	423 (48.4)	56 (26.2)	<0.001 <sup>a</sup>
Not sharing personal belongings or food	24 (2.7)	14 (6.5)	0.012
Regular health checks	117 (13.4)	38 (17.8)	0.126
Balanced diet/nutritional food	76 (8.7)	17 (7.9)	0.829
Taking supplements (vitamin)	32 (3.7)	15 (7.0)	0.049
Vaccination	144 (16.5)	74 (34.6)	<0.001 <sup>a</sup>
Non-respondents	132 (15.1)	10 (4.7)	<0.001 <sup>a</sup>

Values are presented as number (%).

<sup>a</sup> $P < 0.001$ .

lifestyle such as washing hands' 26.2%, 'regular health check-up' 17.8%, 'balanced diet' 7.9%, 'take nutritional supplements such as vitamins' 7.0%, 'not sharing food and personal items' scored 6.5%.

### 3. Awareness of meningococcal meningitis

Among infectious diseases, the awareness of meningococcal meningitis, which was investigated in this study, was significantly higher overseas (67.3%) than domestically (26.5%), and there was a statistically significant difference ( $P<0.05$ ) (Table 3).

The infectious agent of meningococcal meningitis was bacteria, and while only 6.8% of domestic students answered it correctly, 65.9% of international students replied with the correct answer. This shows that the recognition level of international students was higher and more accurate. Moreover, in the case of domestic students, over half of them, 55.8%, answered with 'I do not know'.

When asked about the route of infection of meningococcal meningitis, the correct answer is 'through respiratory droplets and through direct and indirect contacts' 19.6% of domestic students and 24.3% of students in foreign universities ( $P=0.149$ ) answered it correctly. These numbers show that there was no difference in the knowledge of the in-

fection route in both domestic and foreign countries.

In both groups, domestic and international students, the percentage of respondents who answered 'I do not know' was the highest.

### 4. Vaccine requirements upon dormitory entrance

In the case of domestic universities, 15.2% of students answered that they received a vaccination recommendation or request from the school before entering the dormitory. In the case of international universities, students were more active in the universities' requests for vaccination ( $P<0.05$ ) (Table 4).

Among the requested vaccines in Korea, hepatitis B was requested at a rate of (45.9%), other vaccines (23.3%), hepatitis A (10.5%), influenza (9.0%), measles mumps rubella (MMR) vaccine (7.5%), pneumococcal vaccine (6.0%), diphtheria pertussis tetanus (DPT) vaccine (3.8%), polio, chickenpox, human papillomavirus (3.0%), and meningococcal quadrivalent vaccine (2.3%) were scored in that order. On the other hand, students in foreign universities requested vaccines as follows: meningococcal quadrivalent vaccine (69.6%), MMR vaccine (50.7%), hepatitis B (49.3%), hepatitis A (25.6%), influenza (12.6%), human papillomavirus (7.7%), pneumococcus (7.2%), chickenpox, DPT vaccine

**Table 3.** Recognition of meningococcal meningitis

	Domestic (n=874)	Foreign (n=214)	<i>P</i>
Recognition of meningococcal meningitis			<0.001 <sup>a</sup>
Yes	232 (26.5)	144 (67.3)	
No	638 (73.0)	69 (32.2)	
Non-respondents	4 (0.5)	1 (0.5)	
Infectious agent			
Mold/fungus	50 (5.8)	0 (0.0)	0.001 <sup>a</sup>
Virus	248 (28.4)	16 (7.5)	<0.001 <sup>a</sup>
Bacteria	59 (6.8)	141 (65.9)	<0.001 <sup>a</sup>
Pathogenic microorganism	41 (4.7)	0 (0.0)	0.002 <sup>a</sup>
Don't know	488 (55.8)	57 (26.6)	<0.001 <sup>a</sup>
Routes of transmission			
Salivary contact with the carrier by sharing food	160 (18.3)	60 (28.0)	0.002 <sup>a</sup>
Skin and wound contact with the carrier	74 (8.5)	45 (21.0)	<0.001 <sup>a</sup>
Direct/indirect contact with carrier's respiratory breathing	171 (19.6)	52 (24.3)	0.149 <sup>a</sup>
Blood contact with the carrier through transfusion	98 (11.2)	52 (24.3)	<0.001 <sup>a</sup>
Don't know	516 (59.0)	87 (40.7)	<0.001 <sup>a</sup>

Values are presented as number (%).

<sup>a</sup> $P<0.001$ .

(5.3%), other (1.0%). In the case of the meningococcal quadrivalent vaccine, it was found that foreign universities more actively recommend it than domestic universities ( $P<0.05$ ).

## 5. Actual implementation for admission

Vaccines actually inoculated to enter the dormitory were

**Table 4.** University request/recommended vaccination

	Domestic (n=874)	Foreign (n=214)	<i>P</i>
Have you ever heard of a vaccine request in University?			0.001 <sup>a</sup>
Yes	133 (15.2)	207 (96.7)	
No	725 (83.0)	7 (3.3)	
Non-respondents	16 (1.8)	0 (0.0)	
What kind of vaccination did the university request (among respondents to the request)?			
MMR	10 (7.5)	105 (50.7)	<0.001 <sup>a</sup>
Polio	4 (3.0)	2 (1.0)	0.330
Chickenpox	4 (3.0)	11 (5.3)	0.460
DPT	5 (3.8)	11 (5.3)	0.690
Hepatitis B	61 (45.9)	102 (49.3)	0.610
Hepatitis A	14 (10.5)	53 (25.6)	<0.001 <sup>a</sup>
HPV2 or HPV4	4 (3.0)	16 (7.7)	0.120
Meningococcal meningitis	3 (2.3)	144 (69.6)	<0.001 <sup>a</sup>
Influenza	12 (9.0)	26 (12.6)	0.400
Pneumonia	8 (6.0)	15 (7.2)	0.830
Other	31 (23.3)	2 (1.0)	<0.001 <sup>a</sup>
Not sure	33 (24.8)	0 (0.0)	<0.001 <sup>a</sup>
Non-respondents	2 (1.5)	0 (0.0)	<0.001 <sup>a</sup>

Values are presented as number (%).

Abbreviations: DPT, diphtheria pertussis tetanus; HPV, human papilloma virus; MMR, measles, mumps, rubella.

<sup>a</sup> $P<0.001$ .

**Table 5.** Actual vaccination type for entering university dormitory

	Domestic (n=874)	Foreign (n=214)	<i>P</i>
MMR	5 (0.6)	85 (39.7)	<0.001 <sup>a</sup>
Polio	2 (0.2)	0 (0.0)	1.000
Chickenpox	4 (0.5)	11 (5.1)	<0.001 <sup>a</sup>
DPT	3 (0.3)	13 (6.1)	<0.001 <sup>a</sup>
Hepatitis B	47 (5.4)	111 (51.9)	<0.001 <sup>a</sup>
Hepatitis A	8 (0.9)	28 (13.1)	<0.001 <sup>a</sup>
HPV2 or HPV4	3 (0.3)	17 (7.9)	<0.001 <sup>a</sup>
Meningococcal meningitis	1 (0.1)	139 (65.0)	<0.001 <sup>a</sup>
Influenza	15 (1.7)	18 (8.4)	<0.001 <sup>a</sup>
Pneumonia	3 (0.3)	14 (6.5)	<0.001 <sup>a</sup>
Other vaccination	3 (0.3)	2 (0.9)	0.560
Not sure	195 (22.3)	1 (0.5)	<0.001 <sup>a</sup>
Uninoculated	377 (43.1)	8 (3.7)	<0.001 <sup>a</sup>
Non-respondents	241 (27.6)	24 (11.2)	<0.001 <sup>a</sup>

Values are presented as number (%).

Abbreviations: DPT, diphtheria pertussis tetanus; HPV, human papilloma virus; MMR, measles, mumps, rubella.

<sup>a</sup> $P<0.001$ .

investigated (Table 5). Apart from the university recommendation, we investigated the vaccines that were inoculated when entering the dormitory. In Korea, 377 students (43.1%) did not receive a vaccine after admission, 195 (22.3%) did not know, and 241 students (27.6%) did not respond. Among those vaccinated, 47 students (5.4%) received the hepatitis B vaccine, 15 (1.7%) received the influenza vaccine, eight students (0.9%) received hepatitis A vaccine, five students (0.6%) received MMR vaccine, followed with four for chickenpox (0.5%), DPT, human papilloma virus (HPV), pneumococcal and others each three (0.3%), polio two (0.2%). And one (0.1%) answered that they were vaccinated against meningococcal meningitis.

One hundred thirty-nine students in foreign universities received the meningococcal meningitis vaccine (65.0%), 111 (51.9%) received the hepatitis B, 85 (39.7%) the MMR, 28 (13.1%) the hepatitis A, 18 (8.4%) influenza, 17 (7.9%) received the HPV, 14 (6.5%) the pneumococcal, 13 (6.1%) received the DPT, and 11 (5.1%) received vaccines for chickenpox accounting for statistically more compared to domestic in all types except polio vaccine.

## DISCUSSION

Compared to Korean students, the vaccination rate for admission to the dormitory was higher among students from overseas universities, and awareness of infectious diseases and meningococcal meningitis was high. However, the exact route of infection was low both in Korea and abroad.

Meningococcal meningitis is an infectious disease that occurs in groups during group life, such as in kindergartens, schools, and the military.

One in 10 people die, and even if they recover, 11% to 19% of them will have sequelae such as limb amputation or nerve damage. For this reason, the confederation of meningitis organization, an organization of the world meningitis coalition, has designated April 24 of each year as the 'world meningitis day', emphasizing the importance of preventing meningitis. It is considered a significant public health problem worldwide, with an estimated 500,000 cases yearly. In developed countries, it is estimated that 0.5-4 per 100,000 people and 10-25 per 100,000 people in developing countries carry it.<sup>9)</sup>

In Korea, an epidemiological investigation is initiated if three or more meningococcal patients with the same serogroup occur within 3 months and 10 or more cases per

100,000 people in a specific population group. In addition, patients are droplet-isolated for up to 24 hours after starting antibiotic treatment, while people they were in contact with when in need of prophylaxis are considered to administer rifampin, ciprofloxacin, and ceftriaxone within 24 hours.

According to Mbaeyi et al.<sup>16)</sup> which compared the risk of disease or death between those who received the information and those who did not, the incidence of meningococcal disease among the United States college students was lower. However, for the non-college age group between the ages of 18 and 24, students and parents should be aware of the usefulness of the meningococcal vaccine because of the increased risk of contracting the meningococcal disease.<sup>16)</sup>

According to a study by Bruce et al.,<sup>17)</sup> even compared to college students, first-year students living in dormitories had a higher risk of meningococcal disease than college students attending school at home. Vaccination of college students could also reduce the risk of meningococcal disease.<sup>17)</sup>

The effectiveness of meningococcal vaccines varies with age. As a result of confirming the effectiveness of meningococcal vaccination in Gregg County, TX, USA, it was found to be about 85% effective between the ages of 2 and 29 years, and it is said to show a high prevention rate in public health policies.<sup>18)</sup>

In the UK in the 1990s, the number of meningitis cases due to group C and N increased in the UK. Therefore, at the end of 1999, the first vaccination was made twice every 2, 3, and 4 months. Moreover, it was included in the vaccination schedule so that the first vaccination could be administered for those aged 1 to 24 years.<sup>19)</sup>

To prevent meningococcal disease, which has a high mortality rate during the onset of disease, it is necessary to raise awareness of the disease and increase the vaccination rate. Combination vaccine use can dramatically reduce morbidity and mortality against meningococci.<sup>19)</sup>

A study by Bousema and Ruitenberg<sup>20)</sup> also reported a decrease in the incidence of meningococcal disease following the implementation of the vaccination program when assessing trends in meningococcal disease in Italy.

Through each paper, it can be seen that meningococcal vaccination is effective in preventing meningococcal infection and particularly effective in meningococcal vaccination of university students living in dormitories.

According to knowledge attitude and practice-study (KAP-study), a person's demographic, social, economic, and

health-related characteristics influence a person's knowledge of health. Thus, this knowledge affects the person's attitude toward health and health behaviors.<sup>21)</sup>

In order to prevent meningococcal disease, the meningococcal vaccine is required. However, many do not receive the vaccine due to the lack of perception of the vaccine and the disease. Thus, if health education programs are implemented targeting those entering dormitories, it would enhance the perception and knowledge of the vaccine and infectious diseases consequently, resulting in improved vaccine inoculation rates.

Although meningococcal meningitis is a potentially fatal disease, it is crucial to raise awareness of the meningococcal disease, especially in a country like Korea. That is because the current meningococcal vaccination rate in Korea is low. This should mandatorily take place in group life environments such as at the entrance to dormitories.

Domestic college students showed a lower level of recognition of infectious diseases such as meningococcal meningitis compared to those foreign despite the dire danger it can cause, especially in people in group-life style residence. Meningococcal meningitis is a complex disease to diagnose and can cause acute clinical changes to cause high mortality and severe after-effects in more than 1/3 of the infected people.<sup>22)</sup> Thus, vaccination is the best preventive method. A report on the legal communicable disease incidence rate by Korea Disease Control and Prevention Agency shows a rapid increase in reported cases of meningococcal meningitis. Jumping from four cases in 2012 to 16 in 2019.<sup>23)</sup> The data on the occurrence rate of meningococcal meningitis is limited and actual incidence rates among teenagers and college students are expected to be higher.<sup>24)</sup> Specific numbers of professional point to misdiagnosis, limited use of molecular-based laboratory methods and underestimation as the reason for under-rating the disease.<sup>25)</sup> Thus, physicians should have good knowledge of the progression of meningococcal meningitis and be able to report on the disease by differentiating it from other bacterial infections. They should also intervene through programs such as vaccination. It is vital to enhance the level of recognition of infectious diseases in dormitory entering students and boost their inoculation rates by recommending vaccination.

The limitation to our study is first due to the lack of checking on immunization records in those surveyed that their answers on inoculation history might not have been

accurate. Second, the meningococcal vaccination had begun to gain more recognition since the time of the survey due to its recommendation to those travelling to the southern Saharan desert and or to Meccas in Africa or Saudi Arabia.<sup>26)</sup> However, at the time of the survey, it was less known meningococcal vaccination. In addition, there is a limit to representing the group in comparison with the domestic and foreign countries due to the regional and number of survey subjects in this study.

As mentioned, 16 states, including Texas in the United States, require proof of immunization of meningococcal vaccine in entering college students. Even though Korea began to mandate the meningococcal vaccine in military trainees in 2012, the recognition level of its requirement in females remains low. Thus, it is anticipated that incidences of meningococcal infection among females in the country will increase.

Korean colleges have begun to carry a residence-style education format since 2014 for enhanced educational efficacy, possibly increasing the chances of meningococcal infections. Thus, it is of great importance that entering college students, especially those beginning dormitory residence, are taught programs to enhance recognition of infectious diseases and be highly recommended of their inoculations to improve their alertness on infectious diseases, including meningococcus.

## 요 약

**연구 배경:** 수막구균성 수막염은 호흡기 또는 사람과의 접촉을 통해 전파되며 심각하면 사망에 이를 수도 있다. 미국에서는 수막구균 예방접종을 의무화하고 있지만 국내는 필수가 아니다. 그렇기 때문에 본 연구를 통해 수막구균과 같은 감염병에 대한 일반적 지식과 예방접종의 필요성에 대한 인지도를 미국 캐나다 대학 재학생과 국내 대학 재학생과 비교 평가하여 수막구균 예방접종의 필요성을 강조하고자 하였다.

**방법:** 국내외 대학생을 대상으로 기숙사 생활시 발생할 수 있는 감염 질환(수막구균성 수막염 포함) 관련 지식, 백신 접종 의향 등에 대해 자기 기입 방식으로 조사하였다.

**결과:** 해외 대학 재학생들은 감염병에 대한 인식이 국내 보다 높았다. 특히 예방접종을 적극 권장하고 있으며 실제 접종률 또한 국내 대학 재학생보다 높았다.

**고찰:** 국내 대학 재학생의 경우 수막구균 예방접종에 대한 인지도와 접종률 모두 낮았다. 질병에 대한 인식이 낮을 경우 백신접종의 필요성에 대한 인식 또한 낮아진다. 그렇

기 때문에 신입생들을 대상으로 감염 질환에 대한 교육을 진행하면 감염병과 백신의 필요성에 대한 인지도를 높일 수 있을 것이다.

중심 단어: 수막염, 수막구균, 인지도, 예방접종, 감염병

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