

Risk Factors for a Hepatitis A Outbreak in a Building

YOUNGSANG KIM

Department of Medicine

The Graduate School, Yonsei University

Risk Factors for a Hepatitis A Outbreak in a Building

Directed by Professor HEE-CHEOL KANG

The Master's Thesis
submitted to the Department of Medicine
the Graduate School of Yonsei University
in partial fulfillment of the requirements for the degree
of Master of Medical Science

YOUNGSANG KIM

June 2010

This certifies that the Master's Thesis of
YOUNGSANG KIM is approved.

Thesis Supervisor : HEE-CHEOL KANG

DUK CHUL LEE

JONG-UK WON

The Graduate School
Yonsei University

June 2010

ACKNOWLEDGEMENTS

As an epidemic intelligence officer, I was lucky to watch the current states of the contagious diseases. It was a good opportunity for me to understand the epidemiology and the health policy.

This paper is written based on an epidemiologic investigation. For this investigation, many people helped us. First, I'd like to appreciate Dr. Kang and Dr. Ko who investigated this survey together. I also thank Dr. Choi who advised on the progress on this study. I cannot forget the favor of the companies where this outbreak had occurred.

Lastly, I convey my grateful heart to my supervisor, Dr. Kang who helped me to complete this paper.

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ABSTRACT

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YOUNGSANG KIM

*Department of Medicine
The Graduate School, Yonsei University*

(Directed by Professor HEE-CHEOL KANG)

Objectives

On April, 2009, a hepatitis A outbreak occurred in a building. The outbreak was investigated to understand the characteristics of the outbreak and to clarify the risk factors.

Methods

The cases were defined as workers who worked in the building from February to April, 2009, they had medical evidence of hepatitis and they were positive on anti-hepatitis A virus (HAV) IgM antibody tests. This case-control study was conducted with 55 subjects (11 cases and their matched controls). The controls are matched according to gender, age and the employing company among the workers who were negative for IgG and IgM anti-HAV. The progress of the outbreak is described. Stool specimens were tested genetically. General characteristics were compared between the case and control groups. Common candidate risk factors were evaluated between the groups. The menus of the cafeteria at the building and the foods at the restaurants around the building were analyzed, respectively.

Results

The outbreak lasted from March 23 to April 1, 2009. HAV was detected in only one stool specimen. The differences of general characteristics between the groups were not significant. The case group worked overtime significantly more frequently (Odds Ratio (OR) =1.63) than did the control group, but the other differences among the common factors were not significant. The intake of each cafeteria menu didn't differ between the groups. The case group took significantly more leafy vegetables for wrapping (OR=8.81) among the foods eaten outside the building. The frequency of recent overtime work and the intake of leafy vegetables outside the building were still significant according to the multivariate analysis.

Conclusion

A higher frequency of overtime work and a greater intake of leafy vegetables at restaurants around the building increased the risk of infection during the HAV outbreak.

Key words: hepatitis A, acute hepatitis, hepatitis A outbreak, hepatitis A virus, HAV

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YOUNGSANG KIM

*Department of Medicine
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I. INTRODUCTION

1. Background

During the past several years the number of patients with hepatitis A has remarkably increased nationwide. The sentinel surveillance system reported that the number of registered patients with hepatitis A was 2,233 in 2007, 7,895 in 2008 and 14,944 in 2009¹.

Decades ago, many people obtained immunity to hepatitis A virus (HAV) through unapparent infection in childhood because of poor hygiene; now it is expected that the frequency of apparent infection is increasing because the improved hygiene in Korea has reduced the population with this type of immunity². According to previous studies in 1979³, 1989⁴ and 1996⁵, the seropositive rates for HAV for people less than 20 years old were 67.3%, 47.3% and 5.4%, respectively. Another study reported that the seropositive rate for young people between 11 and 20 years old was only 4.2% in 2005⁶. Similarly, the prevalence of anti-HAV antibody among school students in Hong Kong has fallen from 44.8% in 1978 to 7% in 1999⁷.

It has been reported that the risk factors for HAV infection among the reported cases are household or sexual contact, a common source outbreak, men who have sex with men, injection drug users, day care, international travel and so forth⁸. It was reported that many outbreaks of hepatitis A were associated with food handlers in Canada⁹.

Korean researchers studied the clinical features of acute hepatitis A in the western part of Daejeon and Chungnam province between 2000 and 2004; the presumed risk factors were raw fish or shellfish ingestion (30.5%), a travel history (22.2%), close contact with a hepatitis A patient (10.8%) and drinking underground spring water¹⁰ (10.8%). Other studies reported that water from a mineral spring¹¹ and water from an underground spring that was used in a

restaurant¹² were suspected as being sources of HVA infection. Unfortunately, none of these studies described the differences between the patients and the healthy control group.

Several outbreaks were recently noticed and investigated; the cause of one outbreak was revealed to be person to person transmission, but the cause of the others failed to be clarified¹³⁻¹⁵.

2. Objectives

On April, 2009, a company in a financial district in Seoul was notified that several of their workers had HAV and a thorough investigation of this outbreak was conducted. This case-control design study is expected to contribute to understanding the characteristics of this outbreak and discovering the risk factors.

II. SUBJECTS AND METHODS

1. Case definition

On April 2009, a company in a financial district in Seoul notified a health center that about 10 workers were hospitalized with hepatitis A. The cases were defined as the workers who worked in companies located in the same building from February to April, 2009, they had medical evidence of hepatitis and they were confirmed as being positive on an anti-HAV IgM antibody test.

2. Study subjects

This study has a matched case-control design to confirm the risk factors. Eleven cases met the definition and they were included in the study.

A total of 506 workers in 4 companies worked in the building where the hepatitis A outbreak occurred. Antibody testing was conducted for 500 workers. For each case, 4 controls are allocated randomly among the workers with negative results on the anti-HAV IgG and IgM antibody test. The controls were matched with the cases according to gender, age within 2 years and the company where they worked.

3. Survey of cases

The time of onset, the symptomatic period and the associated symptoms among the cases were investigated. The contact history with hepatitis A patients or with the other cases, common exposure at a cafeteria of the building or other restaurants around the building and the travel history were also examined. The stool specimens from the cases were genetically analyzed for confirming homogeneity. Genetic analysis of the stool specimens from the food handlers of

the cafeteria was also conducted. The proportion of cases among the susceptible workers was also calculated.

4. Comparison between the case and control groups

The survey was conducted using structured questionnaires that were developed in cooperation with the Korean Center for Disease Control and Prevention. The questionnaires were sent to the subjects by email, and then each question was confirmed by telephone or a face-to-face interview. The general characteristics of each subject such as gender, age, company of employment, marital status, the number of family members and the existence of children among family members were investigated. The risks of the frequent overtime work, the frequency of the company recently dining outside, the frequency of eating in the cafeteria and eating breakfast were estimated. The significance of each difference was also calculated.

The intake history of the cafeteria menus was analyzed because the cafeteria is the most probable place for workers of the building to be exposed to the same environment.

The frequency of ingesting raw or potentially less cooked foods at the restaurants around the building was examined. Such foods were raw oyster, raw beef, sashimi, vegetables, fruits, etc.

5. Statistical analysis

The cases were analyzed by descriptive statistics.

The differences of general characteristics and the differences of the common candidate risk factors between the cases and controls were tested using conditional logistic regression.

To analyze the intake history of cafeteria menus, the subjects were divided into exposed and unexposed groups for each menu. Exposure was defined as intake more than or equal to half of the food. The risks were calculated before and after adjusting for the frequency of eating in the cafeteria by using conditional logistic regression analysis.

To analyze the intake frequency of each food at the restaurants around the building, the subjects were divided into the exposed and unexposed groups for each item. Exposure was defined as intake more than or equal to the median of amount for each item. Risks were calculated before and after adjusting for the frequency of recent company dining outside by using conditional logistic regression analysis.

After adjusting for the significant variables, the probable risk factors were established using multivariate conditional logistic regression analysis.

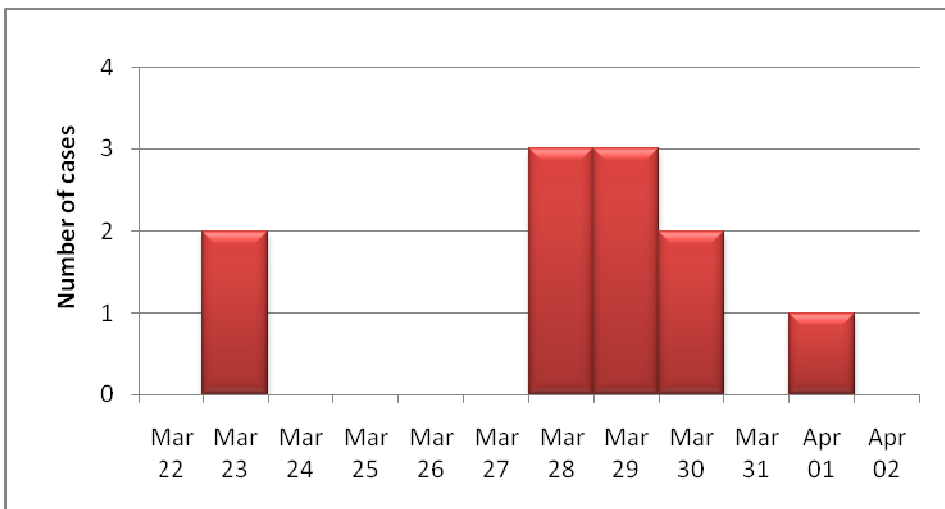
All the analyses were conducted using the R 2.9.2 packages for Windows.

III. RESULTS

1. Survey of the cases

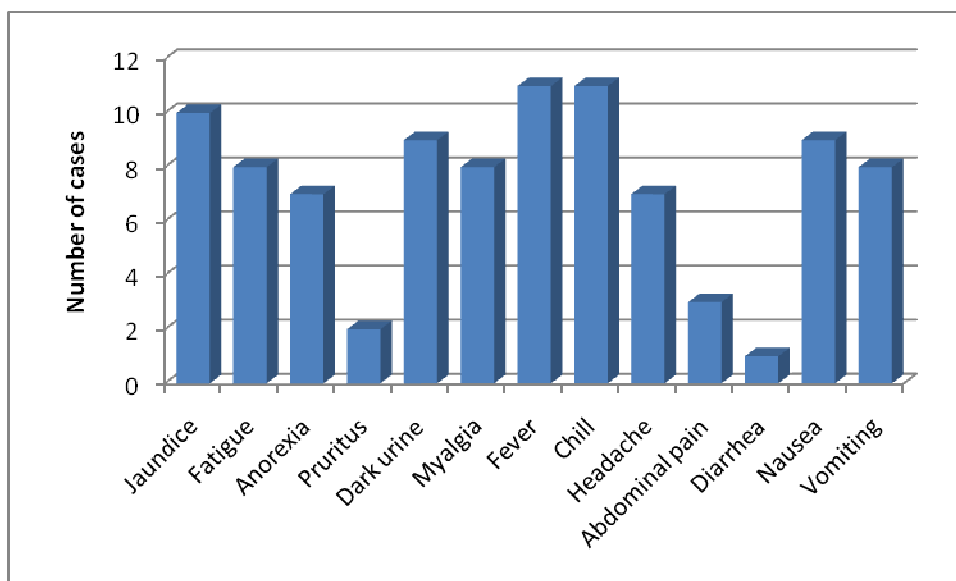
The first two cases developed on March 23, 2009. No more cases were noticed after April 1 when the final case had developed [Figure 1]. The cases stated that they had not met any patients with hepatitis A or an unknown fever. Only one case had a history of traveling abroad. Only a few cases knew each other and there were few opportunities to meet between companies.

Figure 1. Epidemic curve of the hepatitis A outbreak



Among 500 workers whose sera were tested, except for 11 cases and 4 workers who could not be confirmed with a single test, antibody status of 485 workers was confirmed. Considering that the workers with a negative result on the anti-HAV IgG antibody test were susceptible to hepatitis A and the cases were susceptible before being infected, the susceptible workers were 249 before this outbreak; the proportion of the cases among the susceptible subjects was estimated at 4.4%. The major symptoms of the cases were fever, chills and jaundice. Symptoms of abdominal cramps, diarrhea and pruritus were comparatively rare [Figure 2]. According to the genetic analysis of stool specimens from the cases, HAV was detected from only one sample; its subtype was IIIA. HAV was not found in any stool specimens of the food handlers of the cafeteria.

Figure 2. Symptoms of the cases



2. General characteristics and common candidate risk factors

The medians of the duration of being hospitalized and the absence from work were 8 and 13 days, respectively [Table 1]. The differences of the general characteristics between the case and control groups were not significant [Table 1].

Table 1. General characteristics of the study subjects

	Cases (N=11) N (%) or Median (IQR)	Controls (N=44) N (%) or Median (IQR)	P value*
Gender (Male)	8 (72.7%)	32 (72.7%)	-
Age	29 (5)	30 (4.25)	0.862
Company			-
A	7 (63.6%)	28 (63.6%)	
B	2 (18.2%)	8 (18.2%)	
C	1 (9.1%)	4 (9.1%)	
D	1 (9.1%)	4 (9.1%)	
Married	4 (36.4%)	18 (46.2%)	0.541
Number of family members	3 (1.5)	3 (2)	0.529
Existence of children among the family members	3 (30%)	8 (21.1%)	0.428
Number of hospitalized days	8 (5)	-	
Number of days absent from work	13 (8)	-	

* Conditional logistic regression analysis

IQR = interquartile range

The case group worked overtime more frequently (Odds Ratio (OR) =1.63) than did the control group, with significance, but the other differences among the common candidate risk factors were not significant [Table 2].

Table 2. Common candidate risk factors of the study subjects

	Cases N (%) or Median (IQR)	Controls N (%) or Median (IQR)	OR (95%CI)*	P value*
Frequency of recent overtime work (days/week)	4 (1.5)	2 (3)	1.63 (1.00 - 2.65)	0.049
The company recently dining outside (days/month)	2 (2.5)	2 (3)	0.85 (0.56 - 1.31)	0.467
Frequency of eating in the cafeteria (days/week)	4 (1)	4 (1)	1.92 (0.78 - 4.72)	0.153
Breakfast (No vs Yes)	6 (33.3%)	14 (66.7%)	0.33 (0.08 - 1.43)	0.139

* Conditional logistic regression analysis

IQR = interquartile range; OR = odds ratio; CI = confidence interval

3. Intake history in the cafeteria in the building and in the restaurants around the building

The control group ate boiled vegetables, seasoned vegetables and Kimchi more than the case group did [Table 3]. However after including three kinds of menus into the multivariate conditional logistic regression model, each had no significance.

Table 3. Intake history of the cafeteria menus

	OR (95%CI)†	p value†	After adjustment*	
			OR (95%CI)†	p value†
Bibimbap				
Unexposed‡	1.00		1.00	
Exposed§	NA	0.999	NA	0.999
Boiled vegetables				
Unexposed‡	1.00		1.00	
Exposed§	0.19 (0.05 - 0.78)	0.021	0.21 (0.05 - 0.84)	0.027
Seasoned vegetables				
Unexposed‡	1.00		1.00	
Exposed§	0.07 (0.01 - 0.58)	0.014	0.08 (0.01 - 0.63)	0.016
Vegetable salad dressed with chili powder				
Unexposed‡	1.00		1.00	
Exposed§	0.51 (0.13 - 2.03)	0.336	0.44 (0.10 - 2.00)	0.286
Fresh leafy vegetables for wrapping				
Unexposed‡	1.00		1.00	
Exposed§	6.62 (0.73 - 60.24)	0.093	5.59 (0.64 - 49.23)	0.121
Salad				
Unexposed‡	1.00		1.00	
Exposed§	3.91 (0.75 - 20.48)	0.106	3.42 (0.62 - 18.8)	0.158
Dessert/Drinks				
Unexposed‡	1.00		1.00	
Exposed§	0.70 (0.16 - 3.12)	0.645	0.74 (0.14 - 3.78)	0.715
Fresh fruits				
Unexposed‡	1.00		1.00	
Exposed§	3.00 (0.34 - 26.25)	0.321	2.91 (0.30 - 28.59)	0.359
Kimchi				
Unexposed‡	1.00		1.00	
Exposed§	0.19 (0.05 - 0.79)	0.022	0.11 (0.02 - 0.69)	0.018
Acorn jello				
Unexposed‡	1.00		1.00	
Exposed§	0.57 (0.15 - 2.19)	0.411	0.46 (0.12 - 1.80)	0.264
Soft tofu				
Unexposed‡	1.00		1.00	
Exposed§	1.00 (0.21 - 4.71)	1.000	0.53 (0.09 - 3.00)	0.475
Salted squid				
Unexposed‡	1.00		1.00	
Exposed§	0.84 (0.23 - 3.05)	0.793	0.83 (0.23 - 2.98)	0.781

* After adjustment for the frequency of eating in the cafeteria

† Conditional logistic regression analysis

‡ intake less than half of food

§ intake more than or equal to half of food

OR = odds ratio; CI = confidence interval

The case group took significantly more leafy vegetables for wrapping (OR=8.81) among the foods provided at the restaurants around the building than the control group did after adjusting for the frequency of the company recently dining outside [Table 4].

Table 4. Intake frequency at the restaurants around the building

	OR (95%CI)†	P value†	After adjustment*	
			OR (95%CI)†	P value†
Roasted meat				
Unexposed‡	1.00		1.00	
Exposed§	1.00 (0.25 - 4.00)	1.000	1.44 (0.29 - 7.02)	0.653
Raw oyster				
Unexposed‡	1.00		1.00	
Exposed§	0.33 (0.07 - 1.67)	0.181	0.36 (0.07 - 1.83)	0.217
Raw beef				
Unexposed‡	1.00		1.00	
Exposed§	0.52 (0.10 - 2.78)	0.447	0.52 (0.09 - 2.88)	0.452
Sashimi				
Unexposed‡	1.00		1.00	
Exposed§	2.12 (0.48 - 9.41)	0.322	3.16 (0.62 - 16.1)	0.167
Crab preserved in soy sauce				
Unexposed‡	1.00		1.00	
Exposed§	1.19 (0.20 - 7.21)	0.850	1.53 (0.22 - 10.59)	0.669
Other raw foods				
Unexposed‡	1.00		1.00	
Exposed§	1.63 (0.08 - 34.64)	0.753	1.58 (0.08 - 32.23)	0.765
Street food				
Unexposed‡	1.00		1.00	
Exposed§	2.50 (0.68 - 9.11)	0.166	3.01 (0.79 - 11.58)	0.108
Snack stall				
Unexposed‡	1.00		1.00	
Exposed§	0.37 (0.04 - 3.32)	0.374	0.40 (0.04 - 3.64)	0.420
Salad				
Unexposed‡	1.00		1.00	
Exposed§	0.58 (0.15 - 2.18)	0.418	0.61 (0.16 - 2.37)	0.479
Fresh fruits				
Unexposed‡	1.00		1.00	
Exposed§	1.14 (0.23 - 5.70)	0.871	1.11 (0.22 - 5.77)	0.897
Fresh leafy vegetables for wrapping Lettuce, Sesame leaf)				
Unexposed‡	1.00		1.00	
Exposed§	4.70 (0.89 - 24.74)	0.068	8.81 (1.12 - 69.03)	0.038
Fresh vegetables (Cucumber, carrot, green chilli pepper)				
Unexposed‡	1.00		1.00	
Exposed§	1.08 (0.27 - 4.22)	0.916	1.26 (0.29 - 5.42)	0.754
Kimchi				
Unexposed‡	1.00		1.00	
Exposed§	0.27 (0.05 - 1.33)	0.107	0.25 (0.05 - 1.33)	0.104
Korean pancake with sea foods				
Unexposed‡	1.00		1.00	
Exposed§	0.63 (0.14 - 2.80)	0.544	0.69 (0.15 - 3.17)	0.632

* After adjustment for the company recently dining outside

† Conditional logistic regression analysis

‡ intake less than the median amount of food intake

§ intake more than or equal to the median of amount of food intake

OR = odds ratio; CI = confidence interval

The frequency of overtime work and intake of leafy vegetables outside were still significant according to the analysis using the multivariate conditional logistic regression model with adjustment for the frequency of the company recently dining outside [Table 5].

Table 5. Adjusted odds ratios* of the hepatitis A outbreak

	OR (95%CI)	P value
Frequency of recent overtime work	2.22 (1.07 - 4.61)	0.032
Leafy vegetables for wrapping (Lettuce, Sesame leaf)†		
Unexposed‡	1.00	
Exposed§	34.9 (1.33 - 919.05)	0.033

* Multivariate conditional logistic regression analysis including the frequency of recent overtime work and intake of leafy vegetables for wrapping with adjustment for the company recently dining outside

† taken at restaurants around the building

‡ intake less than the median amount of food intake

§ intake more than or equal to the median amount of food intake

OR = odds ratio; CI = confidence interval

IV. DISCUSSION

According to the cases' history, it cannot be judged that HAV was transmitted by direct contact. The differences between the time of the first cases and the time of the other cases were from 5 to 9 days; most cases could not have been transmitted from a specific case as an index case. For these reasons, it is appropriate that this outbreak was caused by foods or water.

The places where foods were exposed to workers are a cafeteria in the building and the restaurants around the building. The foods eaten in each home could be candidates, but there was no report of a cluster of outbreaks in the cases' houses. There was no evidence that any of the food handlers of the cafeteria were the origin of the infection; all of them were confirmed to be negative on anti-HAV IgM antibody tests and HAV was not detected genetically from their stool specimen. The infection could have originated from contaminated food materials or cooking tools at the cafeteria, but the possibility is low considering that there was no difference of the frequency of cafeteria use between the case and control groups and there were no abnormal findings on the environmental survey. On the contrary, the control group significantly ate some of the menus in

the cafeteria.

Food handlers and food materials from any of the restaurants around the building could also have been the source of infection. It was suspected that a specific restaurant could have been an infection source, but it was impossible to find evidence for this. The frequency of the intakes of uncooked or less cooked foods was investigated under the assumption of contaminated food materials. Intakes of leafy vegetables were determined to increase the risk of hepatitis A.

Previous studies showed that oysters¹⁶, clams¹⁷ and cockles¹⁸ were the causes of outbreaks. Hepatitis A outbreaks have also been associated with the consumption of fresh produce contaminated with HAV. The fresh produce was frozen raspberries¹⁹, iceberg lettuce²⁰, frozen strawberries²¹⁻²², green onions²³, etc. It has not yet been shown that any fresh produce was associated with a hepatitis A outbreak in Korea.

An experimental study suggested that the physical characteristics of some contaminated produce items might facilitate transmission. After contaminating lettuce, carrots and fennel with HAV, they were washed with sterile distilled water. HAV was detected from lettuce for 9 days after contamination, but for only 4-7 days for the carrots and fennel. The size and the wrinkled texture of lettuce may provide HAV with favorable circumstances for long persistence. Washing can reduce, but not completely remove detectable HAV²⁴.

It is expected that more frequent overtime work makes workers more exposed to the public environment of the company and surroundings, and to be more fatigued. If the public environment is contaminated, the risk of infection should be increased. It is known that fatigue is associated with mild immunologic disturbance²⁵. Immunologic disturbance can make a person more susceptible to infection.

It is determined from this study that exposure to a HAV-contaminated environment and the fatigue caused by longer working hours in companies increased the risk of hepatitis A. It is also inferred that a greater intake of the contaminated leafy vegetables offered at restaurants around the building increased the risk of hepatitis A. Once leafy vegetables like lettuce and sesame leaf are contaminated, HAV is expected to persist for a long time.

There are four limitations to this study. First, because the virus was detected from only one stool specimen, the homogeneity of the viruses of the cases cannot be guaranteed. Second, because the subjects recalled their intake history for about two months, there are concerns that they may have failed to answer correctly. Third, other buildings could not be investigated. If it is true that contaminated food outside of the work building caused this outbreak, then more patients could exist in other buildings. The hepatitis A patients in other buildings were informed through an unofficial route, but they didn't agree to participate with this investigation. Therefore, it cannot be explained whether the cause of this outbreak was a cause of others' infection. Last, HAV wasn't separated directly from any foods, including leafy vegetables. Since it is

actually difficult to separate virus from foods or water, the cause should be inferred from other evidence.

V. CONCLUSION

In conclusion, a higher frequency of overtime work and a greater intake of leafy vegetables at restaurants around the building increased the risk of hepatitis A. It is anticipated that this study can help provide further information about the transmission pathway of HAV and establish countermeasures against an outbreak.

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APPENDICES

1. Questionnaire – Survey for cases

A형간염 사례조사서

조사자 성명 : _____ 소속 : _____ 연락처 : _____ 조사일 : _____ 년 월 일

■ 일반적 특성			
이름	생년월일	성별	연락처
현거주지 주소			
직업/직장명			부서명
가족사항	동거인(가족) 수 _____명 동거인(가족) 중 3~10세 어린이 유무(①있음, ②없음)		
	동거인(가족)수는 본인을 포함한 수를 말함 일반적 특성은 이름을 빼고는 가장 마지막으로 조사하도록 함(개인정보이므로)		

■ 임상적 특성			
간염 감염력	□있음(① A형, ② B형, ③ C형, ④기타) □없음		□모름
A형간염 예방접종력	□접종받았음 (①1회 ②2회) □받은 적 없음		□모름
Havrix, VAQTA 두종류가 있으며 생후 12개월 이상이면 예방접종이 가능하고 가격은 1회당 어린이의 경우 4만원, 성인은 약 7만원임. 1차 접종 후 6개월 뒤 2차 접종을 해야 함			
증상 여부	있음(발생일 : _____월 _____일) 없음		최초 증상(1개)
동반증상	(1)황 달	□있음 □없음	(2)심한피로감 □있음 □없음
	(3)식욕부진	□있음 □없음	(4)가려움증 □있음 □없음
	(5)붉은 소변	□있음 □없음	(6)메스꺼움 □있음 □없음
	(7)근육통	□있음 □없음	(8)구 토 □있음 □없음
	(9)발 열	□있음 □없음	(10)복 통 □있음 □없음
	(11)오 한	□있음 □없음	(12)설 사 □있음 □없음
	(13)두 통	□있음 □없음	(14)기타증상
HAV(+)인 경우	□진단일 : _____월 _____일 □진단검체 : ①혈액 ②대변		
	□입원(기간 : _____월 _____일~ _____월 _____일) □외래		
	□최초 간기능수치 : AST/ALT(/), □채취일 : _____월 _____일		
	□병원명 : _____		

■ 위혈요인(증상발생 2~6주전, HAV 환자만 기재)						
A형간염(의심) 환자 접촉력	동거인(또는 가족)	<input type="checkbox"/> 있음(①관계 : _____) ②증상발생일 : ____월 ____일 <input type="checkbox"/> 없음 <input type="checkbox"/> 모름				
	가족 외	<input type="checkbox"/> 있음 ①관계 : _____ ②접촉일 ____월 ____일 ③접촉형태 a.성접촉(동성/이성) b.일상적 접촉 c.의료행위로 접촉 d.공동주사기 사용 e.기타(_____) <input type="checkbox"/> 없음 <input type="checkbox"/> 모름				
	동거인(가족)에서 증상발생일은 A형간염(의심)환자의 증상발생일을 말함 일상접촉 : 같이 식사 혹은 술을 마시거나 같은 직장생활 혹은 학교생활 등을 하는 것 의심환자 : A형간염 증상(황달, 오심, 구토, 발열 등)을 나타내어 A형간염 환자로 의심되나 혈액검사를 통해 확진받지 않은 사람 기타 특이사항 기술(주변 접촉자 중 A형간염(의심)환자가 있는 경우)					
해외여행 여부	본인	<input type="checkbox"/> 있음(①기간 : __월 __일~ __월 __일(또는 __일간) ②여행국 _____) <input type="checkbox"/> 없음 <input type="checkbox"/> 모름				
	가족	<input type="checkbox"/> 있음(①기간 : __월 __일~ __월 __일(또는 __일간) ②여행국 _____) ③관계 : _____) <input type="checkbox"/> 없음 <input type="checkbox"/> 모름				
급식소 이용 빈도(week)	평균 _____ 회					
숙수	가정	<input type="checkbox"/> 정수기 <input type="checkbox"/> 끓인물 <input type="checkbox"/> 기타(_____)				
	직장	<input type="checkbox"/> 정수기 <input type="checkbox"/> 끓인물 <input type="checkbox"/> 기타(_____)				
이용 음식점명	구분	순서	음식점명	이용 빈도	섭취음식	소재지(시군구)
	가정	①		약 ____회	생선회, 조개류, 생채소, 과일	
		②		약 ____회	생선회, 조개류, 생채소, 과일	
		③		약 ____회	생선회, 조개류, 생채소, 과일	
	직장	①		약 ____회	생선회, 조개류, 생채소, 과일	
		②		약 ____회	생선회, 조개류, 생채소, 과일	
		③		약 ____회	생선회, 조개류, 생채소, 과일	
④			약 ____회	생선회, 조개류, 생채소, 과일		
		⑤		약 ____회	생선회, 조개류, 생채소, 과일	
이용빈도는 증상발현 2~6주전 기간동안 방문한 횟수를 말함(3월말 증상발생자는 2월중순~3월중순) 섭취음식은 방문한 음식점에서 섭취한 음식에 모두 O 표기함 조개류에는 생굴, 조개젓, 홍합 등을 말함 생채소는 상추, 당근, 오이, 양배추, 양파 등 익히지 않고 섭취한 채소를 말함						
기타 특이사항 기술(감염원, 감염경로 위주)						

2. Questionnaire – Survey for case-control study

A형간염 관련 설문 조사지

본 설문지는 귀사 A형간염 유행에 따른 원인 규명을 위해 만들어진 것입니다.

A형간염은 흔히 음식이나 물, 또는 사람간 접촉에 의해 전파 됩니다.

A형간염에 걸리신 분과 건강한 분들 사이의 차이를 파악하기 위해 이 설문지를 개발하였습니다.

A형간염 환자와 나이, 성별 등이 유사한 건강한 사람들을 무작위 추적을 통해 **대조군**으로 하였습니다.

번거로우시겠지만, 앞으로 진행될 질문에 성의있게 답변해 주시면,

이번 유행 원인 규명에 큰 도움이 될 것입니다. 설문은 약 5분 정도 걸릴 것으로 생각합니다.

설문을 마치시면 [redacted] 감사하겠습니다.

설문을 하시는 중 질문이 있거나, 의견이 있으시면 역시 다음의 연락처를 이용해 주시면 되겠습니다.

개인정보를 비롯한 설문에 대한 내용은 **통계법 제13조 및 전염병예방법 제54조의6**에 의하여 비밀을 보장합니다.

설문 내용 중 [redacted] 부분을 채워 주시면 됩니다. 필요시 한번정도 연락을 드릴 수도 있습니다. 양해 부탁드립니다. 감사합니다.

서울특별시 역학조사관 김 영 상	
Tel.	[redacted]
Mobile	[redacted]
E-mail	[redacted]

I. 인적사항

1 성명:	[redacted]	6 연 사내전화번호: 02-	[redacted]
2 성별:	<input type="radio"/> 남 <input type="radio"/> 여	락 핸드폰:	[redacted]
3 주민번호앞자리:	[redacted]	처 E-mail:	[redacted]
3-1 생년월일:	[redacted]	7 회사명:	[redacted]
(주민번호와 다를 경우만)		7-1 본 건물에서 근무 시작:	<input type="radio"/> 2009년 이전 <input type="radio"/> 09년 1월 <input type="radio"/> 09년 2월 이후
4 결혼여부:	<input type="radio"/> 기혼 <input type="radio"/> 미혼	[redacted]	
4-1 동거인(가족)수(본인포함):	[redacted] 명	8 부서:	[redacted]
4-2 동거인 중 3-10세 어린이 유무:	<input type="radio"/> 유 <input type="radio"/> 무	9 소속팀:	[redacted]
5 거주지(동까지 기재):	[redacted]	10 근무총수:	[redacted] 총

II. 위험요인 - 대략 2월 초부터 3월 중순까지의 기억을 더듬어 보세요.

1 야근 관련

2-3월의 야근횟수:	평균	[redacted]	회/주	지난 11-12월의 야근횟수:	평균	[redacted]	회/주
지난해 11-12월보다 올해 2-3월의 야근의 빈도가 늘었습니까?							
혹은 늘었다고 생각하십니까? <input type="radio"/> 예 <input type="radio"/> 아니오							
2-3월의 회식빈도:	평균	[redacted]	회/주	1회/주미만이면,	평균	[redacted]	회/월

2 구내식당 관련

2-1 구내식당 이용빈도: 평균 회/주
(2회 미만인 경우에는 2-2와 2-3을 건너 뛰십시오.)

2-2 점심식사 (구내식당에 국한)

다음은 1월 마지막 주부터 3월 중순까지의 주 메뉴를 표시한 표입니다.

귀하의 개인 스케줄, 또는 기호로 인해 **구내식당을 이용하지 않은 날**을 표시해 주세요.

위험요인 분석에 있어 **대단히 중요하오니**, 개인 다이어리 또는 달력 등을 이용해서 최대한 답변해 주시면 감사드리겠습니다.

확실한 날만 **v 표시**해 주십시오.

	월	화	수	목	금
1월	26	27	28 <input type="checkbox"/> 이용하지않음 복어해장국	29 <input type="checkbox"/> 이용하지않음 불고기	30 <input type="checkbox"/> 이용하지않음 순두부바지락찌개
	설연휴	설연휴			
2월	2 <input type="checkbox"/> 이용하지않음 공치루조림	3 <input type="checkbox"/> 이용하지않음 굴후라이(튀김)	4 <input type="checkbox"/> 이용하지않음 잡채밥	5 <input type="checkbox"/> 이용하지않음 보쌈	6 <input type="checkbox"/> 이용하지않음 김치수제비
	9 <input type="checkbox"/> 이용하지않음 오곡찰밥/땅콩	10 <input type="checkbox"/> 이용하지않음 함박스테이크	11 <input type="checkbox"/> 이용하지않음 부대찌개	12 <input type="checkbox"/> 이용하지않음 비빔밥/후라이	13 <input type="checkbox"/> 이용하지않음 육개장
	16 <input type="checkbox"/> 이용하지않음 해물된장찌개	17 <input type="checkbox"/> 이용하지않음 돈까스	18 <input type="checkbox"/> 이용하지않음 임연수구이	19 <input type="checkbox"/> 이용하지않음 매운돈갈비찜	20 <input type="checkbox"/> 이용하지않음 닭도리탕
	23 <input type="checkbox"/> 이용하지않음 고등어우조림	24 <input type="checkbox"/> 이용하지않음 탕수육	25 <input type="checkbox"/> 이용하지않음 순두부바지락찌개	26 <input type="checkbox"/> 이용하지않음 카레	27 <input type="checkbox"/> 이용하지않음 미삼영양밥/양념장
3월	2 <input type="checkbox"/> 이용하지않음 불고기	3 <input type="checkbox"/> 이용하지않음 해물짬뽕국	4 <input type="checkbox"/> 이용하지않음 바베큐족찜	5 <input type="checkbox"/> 이용하지않음 두부김치찌개	6 <input type="checkbox"/> 이용하지않음 갈비탕
	9 <input type="checkbox"/> 이용하지않음 낙지볶음/소면	10 <input type="checkbox"/> 이용하지않음 버섯들깨탕	11 <input type="checkbox"/> 이용하지않음 떡만두국	12 <input type="checkbox"/> 이용하지않음 보쌈	13 <input type="checkbox"/> 이용하지않음 알탕
	16 <input type="checkbox"/> 이용하지않음 제육고추장볶음	17 <input type="checkbox"/> 이용하지않음 부대찌개	18 <input type="checkbox"/> 이용하지않음 봄나물비빔밥	19 <input type="checkbox"/> 이용하지않음 굴후라이(튀김)	20 <input type="checkbox"/> 이용하지않음 육개장

2-3 이 메뉴는 구내식당에서 2~3월중순까지 제공된 음식의 일부입니다.

평소 이러한 음식이 제공되었을 때 섭취정도를 답변해 주십시오.

자율 배식하는 메뉴는 일반적 배식량을 기준으로 생각해서 답해주십시오.

예를 들어, 한젓가락만 가져가서 다 드셨다면, 절반 미만에 표시해 주십시오.

<p>1) 비빔밥류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(야채나 나물등이 들어간 것)</p>	<p>2) 나물류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(숙주, 시금치, 콩나물 등)</p>	<p>3) 나물 무침</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(냉이, 돌나물, 봄동, 무말랭이, 단무지 등의 무침)</p>
<p>4) 곁절이류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(얼갈이, 청경채, 썩갓, 상추 등)</p>	<p>5) 각종 쌈류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(상추, 배추쌈 등과 쌈장)</p>	<p>6) 샐러드류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(감자, 고구마, 단호박, 양상추, 과일 등)</p>
<p>7) 후식/음료 류</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(대추, 매실, 모과, 석류, 유자, 수정과, 식혜 등)</p>	<p>8) 각종 생과일</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(귤, 딸기, 바나나, 오렌지, 토마토 등 생과일)</p>	<p>9) 김치</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div> <p>(볶음이나 찌개를 제외한 생김치)</p>
<p>10) 도토리묵</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div>	<p>11) 연두부</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div>	<p>12) 오징어젓무침</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <input type="radio"/> 거의 다 먹음 <input type="radio"/> 절반 이상 먹음 <input type="radio"/> 절반 미만 먹음 <input type="radio"/> 거의 먹지 않음 </div>

3 아침식사

<input type="checkbox"/> 아침식사 하지 않음 아침식사를 하는 경우에는 모두 답해주세요.				
아침식사 장소 (모두) 주 1회 미만인 경우 회/월에 답해주시고, 없으면 0으로 답해주세요.				
가정:	평균	<input type="text"/>	회/주 또는	<input type="text"/> 회/월
노점의 김밥/샌드위치:	평균	<input type="text"/>	회/주 또는	<input type="text"/> 회/월
편의점 김밥/샌드위치:	평균	<input type="text"/>	회/주 또는	<input type="text"/> 회/월
음식점:	평균	<input type="text"/>	회/주 또는	<input type="text"/> 회/월
음식점을 답한 경우 음식점 이름 및 메뉴를 기억나는 대로 기록해 주세요.				
<input type="text"/>				

4 외부 식당

2월 초부터 3월 중순까지 **외부**에서 먹은 **점심식사와 저녁식사**
 또는 **간식**을 기억해 보십시오. 이를 토대로 음식별 섭취 여부를 기록해 주십시오.
 주 1회 미만인 경우 회/월에 답해주시고, 없으면 0으로 답해주세요.

고기 구이: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	샐러드 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
(쇠고기, 돼지고기 등)			(생 혼합채소+드레싱)		
생굴: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	생과일 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
육회: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	(음식점 후식포함)		
생선회: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	쌈용 생채소 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
계장: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	(상추, 깻잎 등)		
기타 날음식: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	일반 생채소 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
항목: <input type="text"/>			(오이, 풋고추, 당근 등)		
길거리음식: 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	김치 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
(떡볶이, 튀김, 오뎅, 순대 등)			(볶음, 찌개 등 제외, 생김치)		
포장마차 음식 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>	해물파전 평균 <input type="text"/>	회/주 또는 <input type="text"/>	회/월 <input type="text"/>
(포장마차 안주류)			(또는 해물이 들어간 전류)		

ABSTRACT(IN KOREAN)

일개 건물 A형 간염 집단 발생의 위험 요인

<지도교수 강희철>

연세대학교 대학원 의학과

김 영 상

목적

2009년 4월, 일개 건물에서 A형 간염 유행이 발생하였다. 이 유행의 특성을 이해하고 위험요인을 밝히기 위해 조사가 이루어졌다.

방법

환례는 2009년 2월부터 4월까지 일개 건물에서 일하고 있는 직원으로, 간염의 의학적 증거가 있고 항 A형 간염 바이러스 IgM 항체 양성인 경우로 정의 하였다. 이 환자-대조군 연구는 11명의 환자군과 짝지은 대조군을 포함해 55명을 대상으로 하였다. 대조군은 항 A형 간염 바이러스 IgG와 IgM 항체 음성인 직원으로 성별, 연령, 다니는 회사를 짝지어 배정하였다. 이 유행의 경과를 기술하고, 대변 검체는 유전학적 검사를 시행하였다. 두 군간 일반적 위험성에 대해 비교하였다. 건물 내에 있는 구내식당과 건물 주변의 음식점들에서 제공되는 음식 섭취에 대해 분석하였다.

결과

이 유행은 2009년 3월 23일부터 4월 1일까지 지속되었다. A형 간염 바이러스는 오직 1개 검체에서만 확인되었다. 두 군간의 일반적 성격은 의미 있는 차이를 보이지 않았다. 환자군은 대조군에 비해 의미있게 추가 근무를 더 자주 하였다 (오즈비=1.63). 구내식당에서의 음식물 섭취는 의미 있는 차이를 보이지 않았다. 건물 주변

음식점에서 섭취한 음식물 중 환자군은 씹용 생채소를 의미 있게 더 자주 섭취하였다 (오즈비=8.81). 최근 추가 근무의 빈도와 건물 주변 음식점에서 씹용 생채소의 섭취는 다변량 분석 후에도 여전히 의미 있었다.

결론

더 빈번히 연장근무를 하는 것과 건물 주변의 음식점에서 씹용 생채소를 섭취하는 것은 이번 A형 간염 유행 동안 감염의 위험을 높였다.

핵심되는 말: A형 간염, 급성 간염, A형 간염 유행, A형 간염 바이러스

PUBLICATION LIST