Advanced Research in Gastroenterology & Hepatology
ISSN: 2472-6400

Juniper Publishers
key to the Researchers

Research Article
Volume 10 Issue 5 - September 2018
DOI: 10.19080/ARGH.2018.10.555797

Adv Res Gastroentero Hepatol

Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire

Yumiko Nagao[1]*, Tetsunori Ozaki[2], Atsushi Kawaguchi[3], Itsuo Chiba[4], Koji Harada[5], Takafumi Saito[6] and Seiji Shiratsuchi[7]

[1]*Department of Organ System Interactions and Information, Saga University, Japan*

[2]*Department of Social Dentistry, Nihon University School of Dentistry, Japan*

[3]*Center for Comprehensive Community Medicine, Saga University, Japan*

[4]*Division of Disease Control & Molecular Epidemiology, Health Sciences University of Hokkaido, Japan*

[5]*Department of Oral and Maxillofacial Surgery, Yamaguchi University Graduate School of Medicine, Japan*

[6]*Division of Clinical Nursing, School of Nursing, Faculty of Medicine, Yamagata University, Japan*

[7]*Shiratsuchi Dental Clinic, Japan*

Submission: June 27, 2018; **Published:** September 18, 2018

***Corresponding author:** Yumiko Nagao, Department of Organ System Interactions and Information, Faculty of Medicine, Saga University, 5-1-1 Nabeshima, Saga 849-8501, Japan, Telephone: +81-952-34-2516, Fax: +81-952-34-2516; Email: nagaoyu@cc.saga-u.ac.jp

Abstract

Background: Over three million people in Japan are estimated to be infected with hepatitis viruses. Dentists need to be aware of measures to prevent transmission and have knowledge of extrahepatic manifestations. However, in Japan, there has been little evaluation of dentists' knowledge of viral hepatitis. We investigated dental care workers for their knowledge of, and countermeasures against, viral hepatitis.

Materials and methods: An anonymous online questionnaire surveying 1,210 members of the Japanese Society of Dental Practice Administration. Interviews were carried out with those who consented. Survey items are attributes, self-management of viral hepatitis, knowledge of liver disease, control of transmission, contacting patients with viral hepatitis, and gathering information on liver diseases.

Results: 153 individuals responded to the questionnaire; 41 had not been immunized against hepatitis B and 61 knew of extrahepatic manifestations. Risk and knowledge deficit scores were significantly higher for workers in dental clinics than those in university settings ($p<0.001$, $p=0.014$).

Conclusion: The respondents had insufficient knowledge of viral hepatitis, a low rate of immunization against hepatitis B and may not follow safe medical practice. It is critical that dentists understand the latest information on hepatitis viruses and acquire knowledge and skills related to medical safety and prevention of infection.

Keywords: Dental health care workers, Online questionnaire survey, Hepatitis C virus, Hepatitis B virus, Oral lichen planus, Nosocomial infection control

Abbreviations: OLP: Oral Lichen Planus; HCV: Hepatitis C Virus; HBV: Hepatitis B Virus; SVR: Sustained Virological Response; DAA: Direct-Acting Antivirals

Introduction

It is estimated that more than 3 million people in Japan are infected with hepatitis B virus (HBV) and/or hepatitis C virus (HCV), and the number of liver cancer deaths annually is about 30,000 [1]. About 65% of liver cancer is caused by HCV infection and about 15% is attributable to HBV infection. Recent advances in direct-acting antivirals (DAAs) have been revolutionary in HCV treatment. It is also known that infection with HCV causes damage not only to the liver but also other organs and tissues [2]. Such extrahepatic manifestations include lymphoproliferative, autoimmune, skin-mucosal and metabolic diseases. Lichen

planus (LP), Sjögren's syndrome, and oral cancer have been reported as extrahepatic manifestations in the oral cavity [3-6].

Japan has been in the forefront of countering hepatitis viruses; the introduction of hepatitis virus tests by the Health Promotion Act (conventional old age health law), the so-called 'turning point examination and examination out of the turning point' (2002), the implementation of free hepatitis examinations (2007), the establishment of the Hepatitis Information Center (2008), the initiation of the medical expenses subsidy program for interferon treatment (2008), and enforcement of the Basic Act on Hepatitis Measures (2010) are of note. Based on the Basic Act on Hepatitis Measures, the underlying philosophy was established, and the responsibilities of the national government and local governments were clarified. Measures against hepatitis have been promoted comprehensively for the prevention, early detection, and treatment of hepatitis.

Meanwhile, because dental care workers often have contact with bodily fluids, such as the blood and saliva of patients, infection control in dental medical institutions is critical. Measures and knowledge of patients infected with HBV or HCV, the most common infections in our country, are essential for dental health workers. However, dental health workers do not necessarily have sufficient knowledge of hepatitis viruses [7,8]. Patients with viral hepatitis may be subject to discrimination and prejudice from healthcare workers, and it is also a concern that they may not declare their own hepatitis virus infection at a dental clinic [9,10].

To date, there have been few reports in Japan where dentists have been investigated in detail regarding their recognition of viral liver disease. Therefore, in this study, we conducted a survey using the Internet to evaluate the recognition of problems of hepatitis by dentists. If we can clarify the problem using this survey, we can contribute to the dissemination of knowledge of liver diseases to dental health workers.

Methods

Subjects

The subjects are the 1,210 members of the Japanese Society of Dental Practice Administration.

Methods

After all members of the Japanese Society of Dental Practice Administration had been notified, we made the anonymous, questionnaire available online from April 27 to June 30, 2017. We explained the purpose of this study on the first page of the online questionnaire and considered those who responded to have provided consent. After answering the anonymous questionnaire survey, those who agreed to a telephone interview provided their name, address and contact telephone number and submitted a written consent form.

Table 1: Items in the anonymous online questionnaire.

Items	No.	Question	Choice
Attributes	1	Residential area	"Hokkaido" "Tohoku" "Kanto" "Chubu" "Kinki" Chugoku" "Shikoku" "Kyush & Okinawa"
	2	Sex	"Male" "Female"
	3	Age	"30s" "40s" "50s" "60s" "70s" "over 80s"
	4	Institution	"University / research institution" "General hospital" "Clinic" "Local public entity" "Company" "Other"
	5	Occupation	"Dentist" "Doctor" "Dental hygienist" "Dental assistant" "Dental technician" "Nurse" "Medical clerk" "Pharmacist" "Clinical laboratory technician" "Radiologist" "Managed dietician" "Public health nurse" "Administrative staff" "Corporate employee" "Student" "Other"
	6	Affiliated society	"Japanese Society for Oral Health" "Others"
	7	Years of service	"Less than 5 years" "5 to 10 years" "10 to 20 years" "20 years or more"
Self-management for viral hepatitis	8	Examination of HBV infection	"I have received" "I have not received" "I do not know"
	9	Examination of HCV infection	"I have received" "I have not received" "I do not know"
	10	Presence or absence of immunization against hepatitis B	"I have received" "I have not received" "I do not know"
	11	Presence or absence of HBV-related liver disease	"I am suffering" "I suffered from hepatitis B a long time ago" "I am not suffering" "I do not know "
	12	Presence or absence of HCV-related liver disease	"I am suffering" "I suffered from hepatitis C a long time ago" "I am not suffering" "I do not know "
Knowledge of liver disease	13	Knowledge that people infected with HCV are more common in West Japan	"I know well" "I know" "I know little" "I do not know at all"
	14	Standard treatment for hepatitis C using oral antiviral drugs	"I know well" "I know" "I know little" "I do not know at all"

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

	15	Knowledge of extrahepatic manifestations of hepatitis virus infections	"I know well" "I know" "I know little" "I do not know at all"
	16	Presence or absence of clinical practice within one year (outpatient examination, inpatient consultation, conference, surgery, diagnosis work, clinical trial)	"I was involved in clinical practice within a year" "I have not been involved in clinical practice within one year"
	17	Interview and diagnosis of liver disease in view of extrahepatic manifestations	"Well" "Little" "Hardly" "Not at all" "Do not know" "Not applicable because I am not engaged in medical treatment"
Nosocomial infection control	18	Presence or absence of medical interview sheet	"There is a medical interview sheet and I am using it" "There is a medical interview sheet, but I am not using it" "There is no medical interview sheet" "I do not know the existence of a medical interview sheet" "This does not apply because I am not engaged in medical consultation"
	19	For those who answered "There is a medical interview sheet and I am using it" at Q18, do you have items of liver disease in your questionnaire?	"Presence" "Absence" "I do not know"
	20	Recognition of standard precautions	"I know the content" "I know mostly" "I've heard the words, but I do not know the details" "I have never heard the words"
	21	Presence or absence of a nosocomial infection control manual, including hepatitis	"There is a manual described about hepatitis" "There is no description of hepatitis although there are manuals" "There is a manual, but the description of hepatitis is unknown" "There is no manual" "This does not apply because I am not engaged in medical consultation"
	22	Use of disposable gloves	"Use new gloves for each patient" "Replace gloves for every 2 or 3 patients" "Replace gloves if they tear" "Replace gloves around twice a day" "Use only for invasive procedures " " Use only when seeing patients with infectious diseases " " None at all " " Do not use gloves fundamentally " " Not applicable because they are not engaged in medical treatment "
	23	Reuse of anesthetic cartridges	"I have never reused them" "I reused them a long time ago" "I am still reusing them sometimes" "I do not know" "This does not apply because I have no experience in medical consultation"
	24	Presence of a high-pressure steam sterilizer	"Presence" "Absence" "I do not know " "This does not apply because I am not engaged in medical treatment"
	25	To those who answered "Presence" to Q24. Do you sterilize used surgical instruments with a high-pressure steam sterilizer?	"I always use anautoclave" "I do not always use an autoclave" "I do not know" "I do not know because I leave it to the staff"
	26	To those who answered "Presence" to Q24. How do you remove the equipment after sterilization? (Multiple answers)	"Remove using a sterile instrument grasping forceps or tweezers" "Save as a sterile pack" "Remove it with a bare hands or non-sterilized rubber gloves" "Do not know" "I do not know because I leave it to the staff"
	27	To those who answered "Absence" to Q 24. The reason (multiple answers)	"To avoid the expense of purchasing an autoclave" "Even if there is no autoclave, I am not in trouble" "Because I am sterilizing by boiling without an autoclave" "Because there is no room for an autoclave" "I am not familiar with autoclaves" " Others "
	28	Sterilization method for high-speed rotating cutting tools, such as bars	"Autoclave" "It is cleaned in an ultrasonic washing machine but not autoclaved" "Just immersed in a chemical solution and not autoclaved" "Wiped with ethanol for disinfection but not autoclaved" "Just washed with detergent and not autoclaved" "None" "I do not do anything in particular" "I do not know" "I do not know because I leave it to the staff" "This does not apply because I am not engaged in medical consultation"
	29	Sterilization method for low-speed rotating cutting tools, such as bars	"Autoclave" "It is cleaned in an ultrasonic washing machine but not autoclaved" "Just immersed in chemical solution and not autoclaved" "Wiped with ethanol for disinfectio but not autoclaved" "Just washed with detergent and not autoclaved" "None" "I do not do anything in particular" "I do not know" "I do not know because I leave it to the staff" "This does not apply because I am not engaged in medical consultation"

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

	30	Management of used high-speed air turbine handpieces	"Autoclave sterilization""Wipe with ethanol for disinfection but do not autoclave""I do not do anything in particular" "I do not know" "I do not know because I leave it to the staff" "This does not apply because I am not engaged in medical treatment"
	31	To those who answered "autoclave sterilization" to Q30. Regarding the rate of exchange	"Always replace after each patient" "Exchange sometimes" "Exchange after infectious patients" "I do not know" "I do not know because I leave it to the staff"
	32	Management of used low-speed contra-angle handpieces	"Autoclave sterilization" "Wipe with ethanol for disinfection but do not autoclave""I do not do anything in particular" "I do not know" "I do not know because I leave it to the staff" "This does not apply because I ams not engaged in medical treatment"
	33	Management of used endodontic treatment instruments (reamers, files, cleansers, etc.)	"Autoclave sterilization" "It is cleaned in an ultrasonic washing machine but not autoclaved" "Just immersed in chemical solution and not autoclaved" "Wiped with ethanol for disinfection but not autoclaved" "Just washed with detergent and not autoclaved" "Nothing" "I do not do anything in particular" "I do not know" "I do not know because I leave it to the staff" "This does not apply because I am not engaged in medical treatment"
	34	Disinfection method for rubber or plastic equipment used for hepatitis virus infected persons	"Immerse in glutaral or phthalal preparations" "Wipe with ethanol for disinfection" "Because it cannot be put in an autoclave, it is often discarded after use" "Only wash with detergent" "Nothing" "Do not know" "I do not know because I leave it to the staff" "This does not apply because I am not engaged in medical treatment"
How to contact patients with viral hepatitis	35	Experience of having problems with hepatitis virus patients	"Frequently" "Occasionally" "Very little" "Not at all" "Do not know" "Not applicable because I am not engaged in medical treatment"
	36	To those who answered "Frequently" or "Occasionally" when a person infected with hepatitis virus was consulted in Q 35. The most troublesome (multiple answers)	"Infection control against liver diseases" "Understanding the pathology of liver diseases" "How to treat liver diseases and nursing" "Observation treatment (tooth extraction and incision, etc.)" "Medication" "Communication with patients" "Doctor's introduction and inquiries to the doctor" "Communication with a doctor specializing in liver disease" "Others"
	37	To those who answered "Frequently" or "Occasionally when a person infected with hepatitis virus was consulted in Q35, The most troublesome (single answers)	Infection control against liver diseases "Understanding the pathology of liver diseases" "How to treat liver diseases and nursing" "Observation treatment (tooth extraction and incision, etc.)" "Medication" "Communication with patients" "Doctor's introduction and inquiries to the doctor" "Communication with a doctor specializing in liver disease" "Others"
	38	Prejudice and discrimination against hepatitis virus infected patients	"Much" "A little" "Not so much" "No at all" "Do not know"
Method of gathering information on liver diseases	39	Do you want to participate in a seminar that provides the latest information on hepatitis?	"I want to participate" "I do not want to participate too much" "Will not participate" "I do not know"
Telephone interview	40	Do you agree to a telephone interview?	"I do not agree" "I agree"

HBV: Hepatitis B Virus; HCV: Hepatitis C Virus

Items in the anonymous, online questionnaire (Table 1):

a) Attributes: Residential area, sex, age, institution, occupation, affiliated society, and years of service

b) Self-management of viral hepatitis: Examination of HBV infection, examination of HCV infection, whether immunized against hepatitis B, presence or absence of HBV-related liver disease, and presence or absence of HCV-related liver disease

c) Knowledge of liver disease: Knowledge that infection with HCV is more common in West Japan, standard treatment for hepatitis C, knowledge of extrahepatic manifestations of infection with hepatitis viruses, and interview and diagnosis of liver disease in view of such extrahepatic manifestations

d) Nosocomial infection control: Presence or absence of medical interview forms, recognition of standard precautions, presence or absence of a nosocomial infection control manual, use of disposable gloves, reuse of anesthetic cartridges, presence of a high-pressure steam sterilizer, and method of sterilization of cutting tools, rotary cutting machines and instruments for root canal treatment after use

e) How to contact patients with viral hepatitis.

f) Method of gathering information on liver diseases.

Analysis of items regarding risk behavior and onset of liver disease, and lack of knowledge (Table 2): Among the questionnaire items, risk scores were given to responses that indicated failure to self-manage hepatitis or to take safe hospital infection countermeasures. Risk was scored as 1 point and no-risk as zero point. In addition, a responder with liver disease was scored as 1 point and one without liver disease as zero point. A person with no knowledge of liver disease was scored as one

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

point and one with knowledge was scored as zero point. For each subject, the scores were totaled for three items: risk behavior, presence of liver disease and lack of knowledge. A high score indicates a dangerous medical situation.

Table 2: Result of online questionnaire by anonymity (153 people).

Items	No.		Variable	n	%	Score of Risk Behavior	Score of Liver Disease Onset	Score of Lack Knowledge
Attributes	1	Residential area	Hokkaido	4	2.6%			
			Tohoku	12	7.8%			
			Kanto	49	32.0%			
			Chubu	19	12.4%			
			Kinki	14	9.2%			
			Chugoku	17	11.1%			
			Shikoku	7	4.6%			
			Kyush & Okinawa	31	20.3%			
	2	Sex	Male	128	83.7%			
			Female	25	16.3%			
	3	Age	30s	10	6.5%			
			40s	25	16.3%			
			50s	62	40.5%			
			60s	51	33.3%			
			70s	5	3.3%			
	4	Institution	University / research institution	46	30.1%			
			General hospital	4	2.6%			
			Clinic	99	64.7%			
			Company	1	0.7%			
			Other	3	2.0%			
	5	Occupation	Dentist	140	91.5%			
			Dental hygienist	10	6.5%			
			Dental technician	1	0.7%			
			Pharmacist	1	0.7%			
			Corporate employee	1	0.7%			
	6	Affiliated society	Japanese Society for Oral Health	45	29.4%			
			Others	120	78.4%			
	7	Years of service	Less than 5 years	2	1.3%			
			5 to 10 years	6	3.9%			
			10 to 20 years	26	17.0%			
			20 years or more	119	77.8%			
Self-management of viral hepatitis	8	Examination of HBV infection	I have received	144	94.1%	0		
			I have not received	8	5.2%	1		
			I do not know	1	0.7%	1		
	9	Examination of HCV infection	I have received	126	82.4%	0		
			I have not received	24	15.7%	1		
			I do not know	3	2.0%	1		
	10	Presence or absence of immunization against hepatitis B	I have received	109	71.2%	0		
			I have not received	41	26.8%	1		
			I do not know	3	2.0%	1		
	11	Presence or absence of own HBV-related liver disease	I am suffering	2	1.3%		1	

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

			I suffered from hepatitis B a long time ago	2	1.3%		1	
			I am not suffering	148	96.7%		0	
			I do not know	1	0.7%		0	
	12	Presence or absence of own HCV-related liver disease	I am suffering	1	0.7%		1	
			I suffered from hepatitis C a long time ago	1	0.7%		1	
			I am not suffering	150	98.0%		0	
			I do not know	1	0.7%		0	
Knowledge of liver disease	13	Knowledge that more people are infected with HCV are more common in West Japan	I know well	21	13.7%			0
			I know	51	33.3%			0
			I know little	56	36.6%			1
			I do not know at all	25	16.3%			1
	14	Standard treatment for hepatitis C using oral antiviral drugs	I know well	28	18.3%			0
			I know	86	56.2%			0
			I know little	25	16.3%			1
			I do not know at all	14	9.2%			1
	15	Knowledge of extrahepatic manifestations of hepatitis virus infections	I know well	8	5.2%			0
			I know	53	34.6%			0
			I know little	73	47.7%			1
			I do not know at all	19	12.4%			1
	16	Presence or absence of clinical practice within one year (outpatient examination, inpatient consultation, conference, surgery, diagnosis work, clinical trial)	I was involved in clinical practice within a year	125	81.7%			
			I have not been involved in clinical practice within one year	28	18.3%			
	17	Interview and diagnosis of liver disease in view of extrahepatic manifestations	Well	12	7.8%			0
			Little	22	14.4%			0
			Hardly	47	30.7%			1
			Not at all	48	31.4%			1
			Do not know	4	2.6%			1
			Not applicable because it is not engaged in medical treatment	20	13.1%			
Nosocomial infection control	18	Presence or absence of medical interview sheet	There is a medical interview sheet and I am using it	139	90.8%	0		
			There is no medical interview sheet	1	0.7%	1		
			It does not apply because it is not engaged in medical consultation	13	8.5%	0		
	19	For those who answered “There is a medical interview sheet and I am using it” at Q18, do you have items of liver disease in your questionnaire?	Those who do not answer “medical interview sheet exists and uses” in Q18”	14	9.2%			
			Presence	128	83.7%	0		
			Absence	10	6.5%	1		
			I do not know	1	0.7%	1		
	20	Recognition of standard precautions	I know the content	97	63.4%	0		
			I know mostly	29	19.0%	0		
			I’ve heard the words but I do not know the details	19	12.4%	1		

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

			I have never heard the words	8	5.2%	1		
	21	Presence or absence of nosocomial infection control manual, including hepatitis	There is a manual informing about hepatitis	104	68.0%	0		
			There is no description of hepatitis although there are manuals	4	2.6%	1		
			There is a manual but the description of hepatitis is unknown	18	11.8%	1		
			There is no manual	19	12.4%	1		
			This does not apply because I am not engaged in medical consultation	8	5.2%	0		
	22	Use of disposable gloves	Use new gloves for each patient	112	73.2%	0		
			Replace gloves for every 2 or 3 patients	15	9.8%	1		
			Replace gloves if they tear	5	3.3%	1		
			Replace gloves around twice a day	2	1.3%	1		
			Use only for invasive procedures	7	4.6%	1		
			Use only when seeing patients with infectious diseases	1	0.7%	1		
			Do not use gloves fundamentally	1	0.7%	1		
			Not applicable because they are not engaged in medical treatment	10	6.5%	0		
	23	Reuse of anesthetic cartridges	I have never reused them	129	84.3%	0		
			I reused them a long time ago	13	8.5%	1		
			I am still reusing them sometimes	2	1.3%	1		
			I do not know	2	1.3%	1		
			This does not apply because I have no experience in medical consultation	7	4.6%	0		
	24	Presence of a high-pressure steam sterilizer	Presence	149	97.4%	0		
			Absence	1	0.7%	1		
			This does not apply because I have no experience in medical consultation	3	2.0%	0		
	25	To those who answered “Presence” to Q24. Do you sterilize used surgical instruments with a high-pressure steam sterilizer?	Those who have not answered “there is an autoclave at Q24”	4	2.6%			
			I always use an autoclave	143	93.5%	0		
			Not always using an autoclave	3	2.0%	1		
			I do not know	2	1.3%	1		
			I do not know because I leave it to the staff	1	0.7%	1		

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

	26	To those who answered "Presence" to Q24. How do you remove the equipment after sterilization? (Multiple answers)	Remove using a sterile instrument grasping forceps or tweezers	75	49.0%	0		
			Save as a sterile pack	95	62.1%	0		
			Remove it with a bare hand or non-sterilized rubber glove	12	7.8%	1		
			Do not know	1	0.7%	1		
			I do not know because I leave it to the staff	8	5.2%	1		
			Other	1	0.7%	0		
	27	To those who answered "Absence" to Q24. The reason (multiple answers)	Other	1	0.7%			
	28	Sterilization method for high-speed rotating cutting tools, such as bars	Autoclave	106	69.3%	0		
			This does not apply because I have no experience in medical consultation	11	7.2%	0		
			It is cleaned in an ultrasonic washing machine but not autoclaved	14	9.2%	1		
			Just immersed in a chemical solution and not autoclaved	10	6.5%	1		
			Wiped with ethanol for disinfection but not autoclaved	3	2.0%	1		
			None	4	2.6%	1		
			I do not know	3	2.0%	1		
			I do not know because I leave it to the staff	2	1.3%	1		
	29	Sterilization method for low-speed rotating cutting tools, such as bars	Autoclave	87	56.9%	0		
			This does not apply because I have no experience in medical consultation	10	6.5%	0		
			It is cleaned in an ultrasonic washing machine but not autoclaved	19	12.4%	1		
			Just immersed in a chemical solution but not autoclaved	18	11.8%	1		
			Wiped with ethanol for disinfection but not autoclaved	6	3.9%	1		
			Nothing	7	4.6%	1		
			I do not do anything in particular	2	1.3%	1		
			I do not know	2	1.3%	1		
			I do not know because I leave it to the staff	2	1.3%	1		
	30	Management of used high-speed air turbine handpieces	Autoclave sterilization	118	77.1%	0		
			Wiped with ethanol for disinfection but not autoclaved	20	13.1%	1		
			I do not know	1	0.7%	1		
			I do not know because I leave it to the staff	2	1.3%	1		

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

			This does not apply because I have no experience in medical consultation	12	7.8%	0		
	31	To those who answered "autoclave sterilization" to Q30. Regarding the rate of exchange	Those who did not answer "to autoclave" in Q30	35	22.9%			
			Always replace after each patient	102	66.7%	0		
			Exchange sometimes	11	7.2%	1		
			Exchange after infectious patients	5	3.3%	1		
	32	Management of used low-speed contra-angle handpieces	Autoclave sterilization	107	69.9%	0		
			Wipe with ethanol for disinfection but do not autoclave	32	20.9%	1		
			I do not know	1	0.7%	1		
			I do not know because I leave it to the staff	3	2.0%	1		
			This does not apply because I have no experience in medical consultation	10	6.5%	0		
	33	Management of used endodontic treatment instruments (reamers, files, cleansers, etc.)	Autoclave sterilization	97	63.4%	0		
			This does not apply because I have no experience in medical consultation	14	9.2%	0		
			It is cleaned in an ultrasonic washing machine but not autoclaved	21	13.7%	1		
			Just immersed ina chemical solution and not autoclaved	14	9.2%	1		
			Nothing	5	3.3%	1		
			I do not know	2	1.3%	1		
	34	Disinfection method for rubber or plastic equipment used for hepatitis virus infected persons	Immerse in glutaral or phthalal preparations	95	62.1%	0		
			Wipe with ethanol for disinfection	2	1.3%	1		
			Because it can not be put in an autoclave, it is often discarded after use	35	22.9%	0		
			Nothing	5	3.3%	1		
			I do not know	2	1.3%	1		
			I do not know because I leave it to the staff	2	1.3%	1		
			This does not apply because I have no experience in medical consultation	12	7.8%	0		
How to contact patients with viral hepatitis	35	Experience of having problems with hepatitis virus patients	Frequently	4	2.6%			1
			Occasionally	31	20.3%			1
			Very little	84	54.9%			0
			Not at all	22	14.4%			0
			I do not know	1	0.7%			0
			This does not apply because I have no experience in medical consultation	11	7.2%			0

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

	36	To those who answered "Frequently" or "Occasionally" when a person infected with hepatitis virus was consulted in Q35. The most troublesome (multiple answers)	Infection control against liver diseases	25	71.4%			
			Understanding the pathology of liver diseases	20	57.1%			
			How to treat liver diseases and nursing	11	31.4%			
			Observation treatment (tooth extraction and incision, etc.)	17	48.6%			
			Medication	12	34.3%			
			Communication with patients	8	22.9%			
			Doctors introduction and inquiries to the doctor	9	25.7%			
			Communication with the doctor of liver disease	6	17.1%			
			Other	1	2.9%			
	37	To those who answered "Frequently" or "Occasionally" when a person infected with hepatitis virus was consulted in Q35. The most troublesome (single answers)	Infection control against liver disease	18	51.4%			
			Understanding the pathology of liver diseases	7	20.0%			
			How to treat liver diseases and nursing	1	2.9%			
			Observation treatment (tooth extraction and incision, etc.)	3	8.6%			
			Medication	1	2.9%			
			Communication with patients	2	5.7%			
			Doctors introduction and inquiries to the doctor	1	2.9%			
			Communication with the doctor of liver disease	1	2.9%			
			Other	1	2.9%			
	38	Prejudice and discrimination against hepatitis virus infected patient	A little	8	5.2%			1
			Not so much	63	41.2%			0
			Not at all	79	51.6%			0
			Do not know	3	2.0%			0
Method of gathering information on liver diseases	39	Do you want to participate in a seminar that provides the latest information on hepatitis?	I want to participate	108	70.6%			0
			I do not want to participate too much	10	6.5%			1
			Will not participate	15	9.8%			1
			I do not know	20	13.1%			1
Telephone interview	40	Do you agree to a telephone interview?	I do not agree	111	72.5%			
			I agree	42	27.5%			

HBV: Hepatitis B Virus; HCV: Hepatitis C Virus

Items of the telephone interviews: We interviewed by telephone those who provided their documented agreement regarding how to cooperate with medical institutions regarding liver disease patients and how to acquire knowledge of liver disease.

Ethics approval and consent to participate: The study was approved by the Ethics Committee of Saga University (reference number: 28-35 and 29-81) in accordance with the Declaration of Helsinki.

Statistical analysis: Summary statistics are shown as frequencies (proportions) for categorical data and as the mean ± standard deviation (SD) for continuous variables. The differences between groups were evaluated by the 2-sided unpaired Student's t-test. A p value <0.05 was considered statistically significant. All

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

statistical analyses were performed using R Statistical Software (version 3.4.3; R Foundation for Statistical Computing, Vienna, Austria).

Results

Aggregate online survey

153 subjects (128 men, 25 women) completed the online questionnaires anonymously (Table 2). Individuals aged in their fifties (62, 40.5%) and sixties (51, 33.3%) accounted for about 70% of the total. There were more responses from directors of dental clinics (99 individuals, 64.7%) than university research institutes and workers in general hospitals (50 individuals, 32.7%). Almost all (91.5%) of the respondents were dentists. 77.8% (119 individuals) who had been engaged in medical treatment for more than 20 years.

Of the responders, 144 (94.1%) and 126 (82.4%) had been tested for HBV and HCV infection, respectively, but 41 (26.8%) had not been immunized against hepatitis B. Four (2.6%) and two (1.3%) had HBV-related and HCV-related liver disease, respectively. Only 72 individuals (47.1%) were aware that there are more HCV-infected people in the western part of Japan but 114 (74.5%) recognized that oral antiviral agents (direct acting antivirals, DAAs) are the standard therapeutic agents for hepatitis C. Sixty one (39.9%) knew of the extrahepatic manifestations of hepatitis virus infections and 34 (22.2%) asked questions and carried out medical examinations regarding HCV infection when examining patients with LP.

The answers to the questions regarding measures for infection control were as follows: There were 10 responders (6.5%) who used questionnaires without liver disease items, 126 (82.4%) who understood the contents of the standard precautions, 104 who had produced manuals for infection control measures, 112 (73.2%) who used disposable gloves for each patient, 129 (84.3%) who had never recycled anesthetic cartridges, 143 (93.5%) who sterilized used surgical instruments, 106 (69.3%) who sterilized used high-speed rotating cutting tools such as bars, 87 (56.9%) who sterilized used low-speed rotating cutting tools such as bars, 118 (77.1%) who sterilized used high-speed air turbine handpieces,107 (69.9%) who sterilized used low-speed contra-angle handpieces, 97 (63.4%) who sterilized used endodontic treatment instruments (reamers, etc.), and 130 (85.0%) who disinfected in a safe way or discarded the instruments used for hepatitis virus-infected patients.

The responses regarding the treatment of patients with liver disease were as follows: Thirty-five (22.9%) had had difficult experiences with hepatitis virus-infected patients, the most serious problem was infection control against liver disease (18/35 individuals, 51.4%), and eight (5.2%) had prejudice and discrimination against hepatitis virus-infected patients. There were 108 responders (70.6%) who wished to participate in seminars providing information on liver diseases.

Analysis of survey items about risk behavior, onset of liver disease, and lack of knowledge

Table 2 shows the scores for risk behavior, onset of liver disease, and lack of knowledge. Table 3 shows average values of the three sets of scores according to residential district, sex, years of service, and institution. The men had a significantly higher risk scores and knowledge deficit scores than the women ($p=0.002$, $p=0.031$). Risk scores and knowledge deficit scores were significantly higher for directors of dental clinics than for university workers ($p<0.001$, $p=0.014$). Dentists with less than 20 years of experience tended to have a higher knowledge deficit score than those with more than 20 years ($p=0.053$). There was no significant difference in the relationship between the responder's residential district and the scores.

Table 3: Scores of risk behavior, onset of liver disease, and lack of knowledge.

Residential Districts	Total Score		West Japan	East Japan	p Value
			n=69	n=84	
	Risk behavior	mean (SD)	2.99 (2.49)	2.98 (2.53)	0.982
	Onset of liver disease	mean (SD)	0.03 (0.24)	0.05 (0.26)	0.652
	Lack of knowledge	mean (SD)	2.45 (1.29)	2.74 (1.55)	0.219
Sex			Male	Female	p value
			n=128	n=25	
	Risk behavior	mean (SD)	3.25 (2.60)	1.60 (1.26)	0.002
	Onset of liver disease	mean (SD)	0.05 (0.28)	0.00 (0.00)	0.399
	Lack of knowledge	mean (SD)	2.72 (1.43)	2.04 (1.40)	0.031
Years of service			20 years or more	Less than 20 years	p value
			n=119	n=34	
	Risk behavior	mean (SD)	2.91 (2.42)	3.24 (2.80)	0.502
	Onset of liver disease	mean (SD)	0.04 (0.27)	0.03 (0.17)	0.799
	Lack of knowledge	mean (SD)	2.49 (1.46)	3.03 (1.31)	0.053

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

Institution			Dental clinics	University research institutes and general hospitals	p value
			n=99	n=54	
	Risk behavior	mean (SD)	3.57 (2.57)	1.91 (1.98)	<0.001
	Onset of liver disease	mean (SD)	0.05 (0.30)	0.02 (0.14)	0.457
	Lack of knowledge	mean (SD)	2.82 (1.46)	2.22 (1.34)	0.014

SD: standard deviation

Result of the telephone interviews

All but one of the 42 subjects who agreed to do so participated in a telephone interview (implementation rate 97.6%) (Table 4). The average interview time was 14.41 minutes. Twenty-two interviewees (53.7%) reported "not performing" or "hardly performing" medical cooperation with patients with liver disease. Documents such as letters were the most frequent means of medical cooperation (16 subjects, 39.0%). Twenty-five (61.0%) responded that there were opportunities to acquire knowledge of liver diseases but reported that seminars for dentists about liver diseases were not available.

Table 4: Results of 41 people who underwent a telephone interview.

Characteristics			(n)	%
Sex (n)		Male/Female	36/5	
Age (yr)		30s	2	4.9
		40s	7	17.1
		50s	15	36.6
		60s	14	34.1
		70s	3	7.3
Hearing time (minutes)		Average time	14.41	
Interview Q1	Do you cooperate medically regarding patients with liver disease?	Yes	17	41.5
		Almost never	2	4.9
		Never	20	48.8
		Not applicable	2	4.9
Interview Q2	What is the means of medical collaboration? (multiple answers)	Documents such as letters	16	39.0
		Telephone	3	7.3
		Communication via the patient	2	4.9
		Using a medical cooperation net surg system	1	2.4
		Not applicable	1	2.4
Interview Q3	Do you have the opportunity to acquire knowledge of liver disease?	Yes	25	61.0
		No	16	39.0
Interview Q4	To the 25 people who answered Yes to Q3. What is the means of acquiring knowledge of liver disease? (Multiple answers)	Participation in academic societies and lectures	15	60.0
		Reading a book	9	36.0
		TV programs and newspapers	1	4.0
		Other	3	12.0

Discussion

On December 31, 2016, 104,533 dentists were registered in Japan, 80,189 men (76.7%), and 24,344 women (23.3%). (Eighty dentists per 100,000 population.) Regarding the type of facility, 89,166 dentists worked in clinics and 12,385 dentists worked in university research institutes and general hospitals: the proportion of dentists working in clinics is increasing year by year.

In this study, the directors of dental clinics had significantly higher risk scores for infection and deficiency of knowledge of hepatitis viruses and infection control than dental physicians working in university research institutes and general hospitals. This indicates a serious problem in securing medical safety in Japan, where the vast majority of dentists work in clinics. Dentists and dental health care workers are at high risk of infection with HBV and HCV during their daily occupational experiences [11].

Following a survey of 253 Japanese dental students between 2006 and 2007, we reported that their understanding of disinfection and sterilization was insufficient [7]. The introduction of a modified curriculum, with appropriate education of students in these matters, were critical issues.

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.

According to a screening study of 141 Japanese dental workers conducted in 2007, fewer than half (48.2%) of the participants had been immunized against hepatitis B [8]. Of 63 immunized individuals, 16 (25.4%) were positive for anti-HBc, indicating past exposure to the virus. The positivity rate of anti-HBc was 85.7% for respondents in their sixties and 100% for those in their seventies; this rate was extremely high for the oldest responders. In routine dental practice, dentists who did not always use disposable gloves accounted for 17% of those who tested positive. Tada et al. surveyed changes in infection control practice reported by dentists in Japan in 2008 and 2011 and factors related to these changes [12]. They reported that the rate of immunization against hepatitis B was 65.4% in 2008 and 67.1% in 2011. Infection control practices significantly associated with the proportion of dentists specializing in oral surgery, the proportion of dentists reporting a willingness to treat HIV and AIDS patients, and the proportion of dentists reporting knowledge on standard precautions. Compliance with effective infection control practices by dentists may be affected by knowledge and education.

We have also reported that 59.8% of HBV and HCV infection with liver disease patients consistently self-declared hepatitis virus infection when undergoing dental treatment [9]. The main reason for not reporting such infections at a dental clinic was because the dentist had not enquired about the possibility of an underlying disease (71.2%).

In the United States, a case of HBV infection related to tooth extraction was reported in 2007 [13]. Nosocomial infection from patient to patient was proved because the HBV nucleotide sequence matched between the patients. In 2013, in the United States, the Centers for Disease Control and Prevention (CDC) issued a report of patient-to-patient transmission of HCV in a dental office [14]. More than 7,000 patients were notified and tested for hepatitis B and hepatitis C viruses and HIV because of unsanitary conditions and improper sterilization of equipment in the office. The Oklahoma State Department of Health reported that 77 people tested positive for hepatitis C, five for hepatitis B and four for HIV.

In Japan, Ogata et al. [15] reported that the major sources of acute hepatitis C virus infection in 2013 were medical procedures and accidental needle sticks. Their study was a retrospective analysis of patients in 12 facilities nationwide who developed acute hepatitis C after 1990. Medical procedures were the most common source of infection, accounting for 32.4% of the 102 patients (33/102). These procedures were as follows: surgery (14 cases), blood transfusion (5), endoscopy (3), intravenous injection (4), invasive procedures (3), dental therapy (3) and dialysis (1).

Mahboobi et al. [16] concluded in their review that dental treatment is a risk factor for acquiring HBV and HCV and that the risk could be eliminated easily using standard precautionary measures.

Based on a revision of the medical law in Japan, general dental clinics were obliged in 2007 to establish medical safety management systems. In June 2014, the Ministry of Health, Labor and Welfare announced a requirement to sterilize the dental handpieces for each patient. In a questionnaire answered by 700 Japanese dental physicians in 2017, the rate of sterilization after replacing used handpieces for each patient was 52%, the rate of exchanging gloves for each patient was 52%, the rate of sterilization after washing used cutting bars was 64% and the ratio of sterilization after washing used root canal treatment devices was 65% [17].

Unfortunately, even in this study of members of the Japanese Society of Dental Practice Administration, the rate of sterilization of instruments was rather low. Despite being at high occupational risk of hepatitis virus infection, only around 70% of the responders had been immunized against hepatitis B The percentage of dentists who treat oral mucosal disease from the viewpoint of extrahepatic manifestations was also small.

Hepatitis C virus is known to cause extrahepatic manifestations such as oral lichen planus (OLP) [6,18]. We performed a genome-wide association study (GWAS) of Japanese HCV-related patients with or without OLP, followed by a replication analysis in an Italian population. It was found that rs884000 in neuropilin-2 *(NRP2)*, rs538399 on insulin-like growth binding proteins factor 4 *(IGFBP4)*, and rs9461799 *(HLA-DR/DQ)* were associated with HCV-positive LP [19].

If dentists encourage examination and treatment of hepatitis through dental and medical cooperation, they can identify and treat patients with undiagnosed hepatitis virus infections. We examined retrospectively oral mucosal disease and HCV infection using the medical record information of 90 patients who consulted a general dental clinic [20]. OLP was the most common oral disease. Among 51 patients who could be examined for the presence or absence of HCV infection, the incidence of that infection was 29.4% (15/51). Among the OLP patients who consulted the dental clinic, we identified a new HCV-infected patient and led an untreated HCV-infected patient to a sustained virological response (SVR).

There have been some reports that have assessed stigma and discrimination in relation to HCV infection within the healthcare setting [21]. We performed a survey of the prejudice and discrimination experienced by HCV/HBV-infected individuals from healthcare workers. Prejudice was most prevalent within the dental clinic setting [10].

Conclusion

We conclude that dentists in Japan do not have sufficient knowledge of viral hepatitis, have a low rate of immunization against hepatitis B and do not necessarily carry out safe medical practices, despite having a high risk of infection. We consider that dental care workers need to understand the latest information on hepatitis viruses and to acquire knowledge and skills related

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797.
DOI: 10.19080/ARGH.2018.10.555797.

to medical safety and prevention of infection. It is necessary to treat the oral cavity with a view to cooperative medical treatment between medical departments and dentistry.

Acknowledgement

We thank Mr. Yuji Kawahigashi (Saga University) for technical support of survey and Dr. Michio Sata (Kurume University School of Medicine, and Nishinihon Hospital) for advice.

Funding

This study was supported in part by a Grant-in-Aid for Scientific Research (C) (No.17K12012) from the Ministry of Education, Culture, Sports, Science and Technology of Japan.

Authors' Contributions

YN conceived the study, analyzed and interpreted the data, and was a major contributor in writing the manuscript. IC, KH, and TS contributed greatly to the design of the study. TO and SS conducted data collection. AK conducted statistical analysis and data analysis. SS gave the final approval to be published. All authors read and approved the manuscript.

Competing Interests

Yumiko Nagao (Corresponding author) belongs to a donation-funded Department funded by Okuda Internal Medicine, Circulatory Medicine and Naniwamarukaiji Inc.. The remaining authors disclose no conflicts.

References

1. Uemura M, Sasaki Y, Yamada T, Gotoh K, Eguchi H, et al. (2014) Serum antibody titers against hepatitis C virus and postoperative intrahepatic recurrence of hepatocellular carcinoma. Ann Surg Oncol 21(5): 1719-1725.
2. Gumber SC, Chopra S (1995) Hepatitis C: a multifaceted disease. Review of extrahepatic manifestations. Ann Intern Med 123(8): 615-620.
3. Nagao Y, Sata M, Tanikawa K, Itoh K, Kameyama T (1995) High prevalence of hepatitis C virus antibody and RNA in patients with oral cancer. J Oral Pathol Med 24(8): 354-360.
4. Koike K, Moriya K, Ishibashi K, Yotsuyanagi H, Shintani Y, et al. (1997) Sialadenitis histologically resembling Sjögren syndrome in mice transgenic for hepatitis C virus envelope genes. Proc Natl Acad Sci USA 94(1): 233-236.
5. Nagao Y, Hanada S, Shishido S, Ide T, Kumashiro R, et al. (2003) Incidence of Sjögren's syndrome in Japanese patients with hepatitis C virus infection. J Gastroenterol Hepatol 18(3): 258-266.
6. Nagao Y, Sata M (2004) Hepatitis C virus and lichen planus. J Gastroenterol Hepatol 19(10): 1101-1113.
7. Nagao Y, Chiba I, Sata M (2004) Survey of hepatitis B and C in students of faculty of dentistry and dental hygienist school. Kansenshogaku Zasshi 78(7): 554-565.
8. Nagao Y, Matsuoka H, Kawaguchi T, Ide T, Sata M (2008) HBV and HCV infection in Japanese dental care workers. Int J Mol Med 21(6): 791-799.
9. Nagao Y, Kawaguchi T, Ide T, Sata M (2008) HCV or HBV infection self-disclosure to dentists. Kansenshogaku Zasshi 82(3): 213-219.
10. Nagao Y, Kawahigashi Y, Kimura K, Nobayashi H, Sata M (2017) Awareness survey of prejudice and discrimination in hepatitis B and C virus- infected individuals. Adv Res Gastroentero Hepatol 7(1): 1-6.
11. Stewardson DA, Palenik CJ, McHugh ES, Burke FJ (2002) Occupational exposures occurring in students in a UK dental school. Eur J Dent Educ 6(3): 104-113.
12. Tada A, Watanabe M, Senpuku H (2015) Factors affecting changes in compliance with infection control practices by dentists in Japan. Am J Infect Control 43(1): 95-97.
13. Redd JT, Baumbach J, Kohn W, Nainan O, Khristova M, et al. (2007) Patient-to-patient transmission of hepatitis B virus associated with oral surgery. J Infect Dis 195(9): 1311-1314.
14. Bradley KK (2013) Dental healthcare-associated transmission of hepatitis C: final report of public health investigation and response. Oklahoma State Department of Health: Tulsa Health Department.
15. Ogata K, Ide T, Kumashiro R, Kumada H, Yotsuyanagi H, et al. (2006) Timing of interferon therapy and sources of infection in patients with acute hepatitis C. Hepatol Res 34(1): 35-40.
16. Mahboobi N, Porter SR, Karayiannis P, Alavian SM (2013) Dental treatment as a risk factor for hepatitis B and C viral infection. A review of the recent literature. J Gastrointestin Liver Dis 22(1): 79-86.
17. Egusa H (2017) Study on development of water purification system for dental unit water supply system (in Japanese). Health Labour Sciences Research. pp. 1-105.
18. Carrozzo M, Scally K (2014) Oral manifestations of hepatitis C virus infection. World J Gastroenterol 20(24): 7534-7543.
19. Nagao Y, Nishida N, Toyo-Oka L, Kawaguchi A, Amoroso A, et al. (2017) Genome-wide association study identifies risk variants for lichen planus in patients with hepatitis C virus infection. Clin Gastroenterol Hepatol 15(6): 937-944.
20. Nagao Y, Tsuji M (2017) The discovery through dentistry of potentially HCV-infected Japanese patients and intervention with treatment. Adv Res Gastroentero Hepatol 7(3): 1-7.
21. Crofts N, Louie R, Loff B (1997) The next plague: stigmatization and discrimination related to hepatitis C virus infection in Australia. Health Hum Rights 2(2): 87-97.

DOI: 10.19080/ARGH.2018.10.555797

How to cite this article: Yumiko N, Tetsunori O, Atsushi K, Itsuo C, Koji H, et al. Survey of Dental Health Care Workers Regarding Their Knowledge of Viral Liver Disease and Prevention of Its Transmission, Using an Online Questionnaire. Adv Res Gastroentero Hepatol. 2018; 10(5): 555797. DOI: 10.19080/ARGH.2018.10.555797.