

## INFECTIOUS DISEASE

# A surveillance for hepatitis C virus infection in northeastern, Thailand: a 10-year cohort

TANITA SUTTICHAIMONGKOL, CHITCHAI RATTANANUKROM, ARTHIT WONGSAENSOOK, WATTANA SUKEEPAISARNJAROEN, KITTISAK SAWANYAWISUTH

Department of Medicine, Faculty of Medicine, Sleep Apnea Research Group, Khon Kaen University, Khon Kaen, Thailand

## Keywords

Hepatitis C virus • Sex • Age

## Summary

**Introduction.** *Hepatitis C virus (HCV) infection is an infection that may lead to cirrhosis and hepatocellular carcinoma. Most patients with HCV infection are asymptomatic. The previous study conducted in age group of 30-64 years and in two provinces. Additionally, most surveillance studies conducted in a point period; not longitudinally. This study aimed to evaluate HCV infection rate in all age groups in the northeastern, Thailand in a longitudinal fashion.*

**Methods.** *This was a surveillance study conducted in 20 provinces of northeastern, Thailand. The study period was between July 2010 and November 2019. During the surveillance, demographic data of participants were collected. HCV screening test was performed in each participant by using a rapid point-of-care assay. Rates of HCV infection in each province and in overall were calculated.*

**Results.** *During the surveillance period, there were 31,855 subjects who participated the project. Of those, 1,285 subjects (4.037%) were tested positive for HCV infection (Tab. 1). The HCV infection rate was highest in 2011 (8.98%); ranges 1.28 to 9.59%. The age group of over 50 years had 690 subjects with HCV infection (5.45%) out of 12,660 subjected tested in this age group. There was significant different among age groups ( $p < 0.001$ ) and difference of age over 30 years and sex ( $p 0.043$ ).*

**Conclusions.** *This longitudinal surveillance showed that HCV infection rates in northeastern, Thailand were varied across the provinces with the highest rate of 9.59%. The HCV infection should be aware in male with age over 30 years.*

## Introduction

Hepatitis C virus (HCV) infection is an infection that may lead to cirrhosis and hepatocellular carcinoma. Its global prevalence was approximately 1.6% or 115 million persons [1]. HCV infection is much more common in adults compare with children (90%:10%) or 104 vs 11 million patients [1]. The prevalence rate of HCV infection is varied among countries with the highest rate in Egypt at 14.70%.

A serological surveillance in 310 Belgian forest workers showed seroprevalence of Lyme disease which determined the population at risk for those asymptomatic [2]. Patients with HCV infection are mostly asymptomatic. Therefore, community surveillance may be helpful to identify infected patients. In Thailand, endemic areas for HCV infection, found the prevalence of HCV infection was 6.9% reported in 2020 and previously reported to be 15.5% in 2017 [3, 4]. The previous study conducted in age group of 30-64 years and in two provinces [5]. Additionally, most surveillance studies conducted in a point period; not longitudinally. This study aimed to evaluate HCV infection rate in all age groups in the northeastern, Thailand in a longitudinal fashion.

## Methods

This was a surveillance study conducted in 20 provinces

of northeastern, Thailand. The study period was between July 2010 and November 2019. The surveillance was conducted in multiple areas in each province on a random basis. Each surveillance comprised of HCV screening and educational activities regarding HCV awareness by multidisciplinary health care team. The concept of awareness of HCV infection according to the world hepatitis alliance was implemented.

During the surveillance, demographic data of participants were collected. HCV screening test was performed in each participant by using a rapid point-of-care assay (One Step Rapid Test for HCV; HEALGEN, TX77401, USA). This rapid test has sensitivity and specificity for HCV infection of 98.1% and 98.9%, respectively. Those with test positive for HCV infection were referred for proper treatment. Rates of HCV infection in each province and in overall were calculated. Descriptive statistics were used to compute the differences by age group and sex. A p-value of less than 0.05 considered statistical significance.

The study protocol was approved by the ethic committee in human research, Khon Kaen University, Thailand (HE621134). An informed consent was not obtained due to retrospective data collection.

## Results

During the surveillance period, there were 31,855 subjects who participated the project. Of those, 1,285 subjects

**Tab. I.** Details of hepatitis C virus (HCV) infection by the HCV surveillance project in northeastern, Thailand.

Year	Total tested for HCV (n)	Test positive for HCV (n)	Test positive for HCV (%)
2010	419	24	5.73
2011	846	76	8.98
2012	2,964	162	5.46
2013	4,761	253	5.31
2014	5,076	88	1.73
2015	3,139	66	2.10
2016	4,314	279	6.46
2017	4,811	255	5.30
2018	2,948	53	1.79
2019	2,577	29	1.12
Total	31,855	1,285	4.03

(4.037%) were tested positive for HCV infection (Tab. I). The HCV infection rate was highest in 2011 (8.98%). Among 20 provinces, Udonthani and Khon Kaen province were the top two provinces with the highest HCV infection rate at 9.59%, and 7.86% (Tab. II). The HCV infection ranged from 1.28 to 9.59%. The age group of over 50 years had 690 subjects with HCV infection (5.45%) out of 12,660 subjected tested in this age group (Tab. III). There was significant different among age groups ( $p < 0.001$ ) and difference of age over 30 years and sex ( $p 0.043$ ).

## Discussion

As previously reported, estimation of disease is not enough for people who inject drugs [6]. HCV infection

is estimated to be 52.3% of people with inject drug. This surveillance showed that average HCV infection rate in this 10-year cohort among 20 provinces. The highest rate of HCV infection was higher than the recent survey in 2020 (9.59% vs 6.9%) [3].

This study found similar findings with the previous study on HCV infection rate among age groups [4]. The seroprevalence was low at age group of under 35-40 years: ranges 0.0-3.5%. In this study, we found that the HCV infection rate was dramatically increasing from 0.0%-0.90% in age group below 30 years to 3.74% in age group of 31-40 years (Tab. III) which was also statistically significant ( $p < 0.001$ ). However, this rising rate was not shown in both groups: only male sex ( $p = 0.043$ ). The female group had quite steady rate from 0.0% to 0.77% (Tab. III). These findings may be explained from higher rate of people with inject drug in male patients. A study from northern, Thailand found that 81.8% out of 164 people with inject drug were male and 57.3% of subjects had first intravenous drug use at age below 24 years [7]. These finding may also explain why the HCV infection was significantly increased after age group of 30 years.

This study showed 10-year surveillance in almost provinces in the northeastern, Thailand. However, there are some limitations. First, participants in the project were those participated the world hepatitis alliance in that province. The total population tested for HCV infection was quite large at 31,855 persons though. And, the HCV test was the point of care test but it has a good sensitivity and specificity [8]. Some related conditions were not studied [9-16]. Finally, HCV genotypes were not evaluated.

**Tab. II.** Details of hepatitis C virus (HCV) infection by the HCV surveillance project in northeastern, Thailand categorized by province.

Provinces	Year tested	Total tested for HCV (n)	Test positive for HCV (n)	Test positive for HCV (%)
Beung kan	2017	603	25	6.51
Khon Kaen	2010-2019	4,913	386	7.86
Sakon Nakhon	2012-2014, 2017	981	26	2.65
Si sa ket	2014-2017	1,727	64	3.70
Burirum	2012-2016, 2018	1,647	58	3.52
Mukdaharn	2015, 2017	462	10	2.16
Amnat Chareon	2017	261	13	4.98
Maha Sarakam	2013, 2015-2017	1,459	56	3.84
Udonthani	2011-2017	1,365	131	9.59
Nong khai	2013-2019	4,332	118	2.72
Nakorn Panom	2015, 2017	766	22	2.87
Ubon Ratchathani	2013, 2014 2018	975	15	1.54
Nakorn Ratchasima	2012, 2014, 2016, 2019	1,571	43	2.74
Chaiyaphum	2013-2014, 2016, 2017	1,906	74	3.88
Surin	2011-2019	3,275	61	1.86
Kalasin	2013-2014, 2016-2019	2,151	114	5.29
Loei	2014, 2018	701	9	1.28
Roi-et	2012-2014, 2018	2,069	47	2.27
Yasothon	2018	304	7	2.30
Nong bua lumphu	2016, 2019	387	6	1.55
Total		31,855	1,285	4.03

**Tab. III.** Details of hepatitis B virus (HCV) infection by the HCV surveillance project in northeastern, Thailand categorized by age group and sex.

Age group	Total tested (n)	Test positive for HCV, n (%)	Test positive for HCV, n (%)	
			Male	Female
0-10	210	0	0	0
11-20	1,053	1 (0.9)	1 (0.09)	0 (0)
21-30	3,919	25 (0.65)	17 (0.43)	8 (0.2)
31-40	4,247	159 (3.74)	135 (3.18)	24 (0.56)
41-50	9,766	410 (4.19)	335 (3.43)	75 (0.77)
> 50-60	12,660	690 (5.45)	607 (4.79)	83 (0.66)
Total	31,855	1,285 (4.03)	1,095 (3.44)	190 (0.60)

## Conclusions

This longitudinal surveillance showed that HCV infection rates in northeastern, Thailand were varied across the provinces with the highest rate of 9.59%. The HCV infection should be aware in male with age over 30 years.

## Acknowledgements

None.

## Conflict of interest statement

The authors declare no conflict of interest.

## Authors' contributions

Tanita Suttichaimongkol: study design, data interpretation, writing a draft; Chitchai Rattananukrom: data interpretation, review a manuscript; Arthit Wongsanook: data interpretation, review a manuscript; Wattana Sukeepaisarnjaroen: study design, data interpretation, review a manuscript; Kittisak Sawanyawisuth: study design, data interpretation, review a manuscript.

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**Correspondence:** Kittisak Sawanyawisuth, MD, PhD, Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, 40002, Thailand. Tel.: 66-43-363664 - Fax: 66-43-348399 - E-mail: [kittisak@kku.ac.th](mailto:kittisak@kku.ac.th); Wattana Sukeepaisarnjaroen, MD, Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, 40002, Thailand - Tel.: 66-43-363664 - Fax: 66-43-348399 - E-mail: [wattanasukee@gmail.com](mailto:wattanasukee@gmail.com)

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