Epidemiology and Prevention of Hepatitis E

30 Dec 2010
Content

- Hepatitis E and epidemiology of hepatitis E
- Local situation of hepatitis E
- Foodborne hepatitis E in HK
- Prevention of hepatitis E
Hepatitis E

- Viral hepatitis is the inflammation of liver caused by virus (A/B/C/D/E)
  - HAV and HEV - contaminated food or water
  - HEV – recognised as an aetiological agent in 1980s

- Symptoms: fever, malaise, anorexia, nausea, abdominal pain, dark urine and jaundice; usually self-limiting and resolves in 2 weeks

- Incubation period: 2 to 9 weeks (Mean 26 to 42 days)

(Source: CDC, USA)
High risk populations

- High risk populations: pregnant women, elderly, patients with chronic liver diseases
  - Pregnant women: death of mother and foetus, abortion, premature delivery
    (Case-fatality rate – 20% in 3rd trimester)
  - Patients with preexisting chronic liver disease: case-fatality rate – 70%

(Source: CDC, USA)
Transmission route of Hepatitis E

- Faecal-oral route
  - Contaminated water
  - Meat or offal
  - Blood transfusion
  - Occupational exposure e.g. pig farmers, veterinarians

Other animals:
- Pigs, boar, deer, rex rabbit and wild rats, etc.
Different genotypes of HEV

- Four main genotypes of mammalian HEV
  - **I**: Asia, North Africa, and South America; major cause of water-borne epidemics and significant sporadic disease
  - **II**: Mexico, central Africa, and Nigeria
  - **III**: Wide prevalence in pig population worldwide; sporadic human cases in developed region such as US and several European countries
  - **IV**: Asian countries, including China, Japan, Taiwan and Vietnam; humans and domestic pigs
Endemic areas around the world

(Source: CDC, USA)
http://www.cdc.gov/hepatitis/HEV/HEVfaq.htm
## Hepatitis E in developing and developed countries

### Developing countries / regions
- Peak incidence in sporadic cases → 15 to 35 years old
- Common in developing countries with inadequate environmental sanitation
  - Asia, the Middle East, Africa, and central America

### Developed countries / regions
- Autochthonous cases → middle-aged and elderly men
  - (UK: Mean=65 years; Japan: Mean=60 years; France: Mean=54 years)
- Rare in developed countries; mostly travellers to endemic developing countries
- Increase in report of sporadic cases without travelling has been identified

(Dalton HR, et al., Lancet Infect Dis, 2008)
Local situation of hepatitis E
Hepatitis E in HK

Rising trend of hepatitis E cases in recent years

2008: 90
2009: 73

Number of viral hepatitis A & E cases (1998 to 2007)

Centre for Health Protection, 2008
Local hepatitis E cases

- 51 cases analysed, CHP, 2008
  - 65%: no travelling to endemic area
  - Consumed raw or semi-cooked food, e.g. shellfish (33%) or pig offal (26%)

- Most human isolates are genotype IV

- Median age: 49 years old (Review of cases from 1998 to 2008 in HK)
Foodborne hepatitis E in HK
Foodborne Hepatitis E in HK

- Faecal-oral route
  - Contaminated water
  - Meat or offal
  - Blood transfusion
  - Occupational exposure (e.g. pig farmers, veterinarians)

Pigs

Deer and Boar
Foodborne Transmission?

- Shellfish - Bivalve molluscs
  - Comparison of hepatitis A and hepatitis E cases (2002)
    - Hepatitis A cases: recent history of taking shellfish
    - Hepatitis E cases: travel to endemic area
  - Previous examination of bivalve shellfish did not show that they were the major vehicle locally

- Pig livers
  - HEV in commercial pig liver – US:14/127 (11%); Japan: 7/363 (1.9%); Netherlands: 4/62 (6.5%)
  - Local - 100 samples were collected from slaughterhouse in 2009
# HEV in Fresh Pig Livers

<table>
<thead>
<tr>
<th>Types of Pigs</th>
<th>Age</th>
<th>No. of Positive / No. of Sample (Positive rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porker (肉豬)</td>
<td>Around 6 months old</td>
<td>0/49 (0%)</td>
</tr>
<tr>
<td>Roaster (燒種豬)</td>
<td>Around 4 months old</td>
<td>16/51 (31%)</td>
</tr>
</tbody>
</table>

- Only found in Roaster samples (<2% of total admission of pigs from Mainland)
- Local live pigs (only porkers) among locally slaughtered pigs: 5%
## HEV in Fresh Pig Livers

<table>
<thead>
<tr>
<th>Sample no.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1</td>
<td></td>
</tr>
<tr>
<td>Sample 2</td>
<td>Human</td>
</tr>
<tr>
<td>Sample 3</td>
<td>Human</td>
</tr>
<tr>
<td>Sample 4</td>
<td>Human</td>
</tr>
<tr>
<td>Sample 5</td>
<td>Human</td>
</tr>
<tr>
<td>Past case in 2007</td>
<td>Human</td>
</tr>
<tr>
<td>Past case in 2006</td>
<td>Human</td>
</tr>
<tr>
<td>V09-046</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-069</td>
<td>Pig</td>
</tr>
<tr>
<td>Cluster 2</td>
<td></td>
</tr>
<tr>
<td>Sample 7</td>
<td>Human</td>
</tr>
<tr>
<td>V09-058</td>
<td>Pig</td>
</tr>
<tr>
<td>Cluster 3</td>
<td></td>
</tr>
<tr>
<td>Sample 6</td>
<td>Human</td>
</tr>
<tr>
<td>V09-035</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-082</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-116</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-117</td>
<td>Pig</td>
</tr>
<tr>
<td>Cluster 4</td>
<td></td>
</tr>
<tr>
<td>Sample 1</td>
<td>Human</td>
</tr>
<tr>
<td>V09-003</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-079</td>
<td>Pig</td>
</tr>
<tr>
<td>V09-110</td>
<td>Pig</td>
</tr>
</tbody>
</table>

**Sequence analysis**

- Of 48 human cases with onset from Jan to Jul, 7 isolates had same partial sequence as 10/16 pig isolates
- Of these 7 human isolates, only 3 recalled consumption of pig offal (liver or intestine)
HEV in developed countries

- HEV from cases acquired locally showed the closest with pig strains from the same region in comparison with those from travel-related cases.

- Detection of HEV in commercial pig livers
  - E.g. U.S., Netherlands, Japan

- Detection of HEV in pig samples from farms or slaughterhouses
Different types of samples (serum, bile, stool) were used in studies in other countries.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Ages and Positive rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>~4 months old pigs: 31% (16/51)</td>
</tr>
<tr>
<td>Southern France</td>
<td>3 months old pigs: 65% (65/100)</td>
</tr>
<tr>
<td>Northern Italy</td>
<td>3-4 months old: 42.2% (27/64)</td>
</tr>
<tr>
<td>Japan (20 prefectures)</td>
<td>3 months old pigs: 10% (32/310)</td>
</tr>
<tr>
<td>Japan (some prefectures)</td>
<td>3 months old pigs: 15% (113/750)</td>
</tr>
<tr>
<td>Korea</td>
<td>3 months: 6.7% (2/30)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Farms positive rate: 55% (53/97)</td>
</tr>
<tr>
<td></td>
<td>Pooled sample from pigs (mean 20 weeks)</td>
</tr>
<tr>
<td>Thailand (two provinces)</td>
<td>2 months old pigs: 27.5% (11/40)</td>
</tr>
</tbody>
</table>
HEV in Pigs

- Pigs possibly contracted HEV during young age
  - Appear clinically normal
  - Excrete virus in faeces
  - HEV present in pigs for some period of time, i.e. 2 to 3 wks
  - Production of antibodies in response to infection
  - Infected pigs recover without showing symptoms

- HEV was only detected in liver of roaster pigs, but not porker pigs which is around 6 months old
Transmission to humans

- May present in humans and imported pigs for quite a while
  - Some isolates from present and past cases were found to have same partial sequence as pig isolates

- Pigs could be one possible source, but other potential sources exist:
  - 7/48 cases with same partial sequence as pigs, and only 3 recalled consumption of pig offal
  - Contaminated water, consumption of raw or undercooked shellfish
  - Other transmission routes: blood transfusion and occupational exposure

- Difficult to determine exact source of each case due to the long incubation period
Prevention of hepatitis E
Food Safety Advice

- Comparing to bacteria, viruses are more resistant to heat. Need to cook food more thoroughly to kill pathogenic viruses! Esp. hotpot, congee
  - Prepare thin slices

- Pig livers: Boil sliced pig liver at 100°C or stir-fry in hot skillet/wok for at least three to five minutes (depending on thickness and quantity)

- Shellfish:
  - Heating to an internal temperature of 90°C for 90 seconds
  - Boil at 100°C until their shells open; boil for additional three to 5 minutes afterwards

- Use separate chopsticks and utensils for handling raw and cooked foods
  - For hotpot, provide utensils of different colour for raw and cooked food!
Cooked in boiling water

- Boiled for 1 min
- Boiled for 2 minutes
- Boiled for 2 1/2 minutes
- Boiled for 3 minutes
Cooked in congee

- Boiled for 1 min
- Boiled for 2 minutes
- Boiled for 3 minutes
- Boiled for 5 minutes
Advice on Personal Hygiene

- Currently, no vaccines

- Wash hands thoroughly with running water and soap for 20 seconds
  - Before handling food and often during food preparation
  - After handling raw meat or offal
  - Before eating
Advice to Travellers

- Maintain good personal and food hygiene

- Avoid drinking water and/or ice of unknown purity and eating uncooked shellfish, uncooked fruits or vegetables that are not peeled or prepared by the travellers
Conclusion

- Hepatitis E virus generally causes self-limiting disease, but can cause serious complication in some high risk populations

- Foodborne hepatitis E may contribute to rising trend of hepatitis E in Hong Kong

- Ensure food safety practice to prevent hepatitis E
Thank you