

CHAPTER VI

References

- Patumanond J. 1998. **Medical Epidemiology**. First printing. Bangkok: Suksopa press.

The book addresses the concept of epidemiology for medical researches. The author begins with the role of epidemiology in science and public health, strategies of epidemiology, overview on study design, basic measures in epidemiology, details on each study design and also studies size estimation. It suggests using cross-sectional analytic study for occupational disease, which has a wide incubation period or insidious onset.

- Faine, S. 1998. Leptospirosis. In: Hausler WJ Jr, Sussman M, eds. **Topley and Wilson's microbiology and microbial infections**. 9th Ed. pp.849-69. Arnold, London, England. .

This book addresses the overview of leptospirosis, mode of transmission, clinical manifestation, pathogenesis, diagnosis and treatment. The author explains by using the picture for each clinical manifestation and a clear picture to explain the mode of transmission.

- Faine, S. 1982. **Guidelines for the control of Leptospirosis**. Geneva: World Health Organization (W.H.O. offset publication no. 67).

This book gives a lot of details in each topic of leptospirosis. It also gives the details of both human and animal leptospirosis. This book provides 1) the method of epidemiological linkage between human and animal leptospirosis. 2) the estimated sample size to collect the serum of human and animal of outbreak situation 3) the method to combat with rodent 4) the chemical to eliminate *leptospire*s in environment and also the standard guideline to diagnose both human and animal leptospirosis.

- Tangkanakul, W, Tharmaphornpil, P, Plikaylis, BD, Poonsuksombat, D, Choomkasian, P, Kingnate, D, Ashford, DA. Risk factors associated with leptospirosis infection in northeastern Thailand, 1998. **Am. J. Trop. Med. Hyg.** (inpress).

This is an article dealing with the results of a matched case control study (age and sex) in the northeastern province, Thailand. Cases confirmed by IgM ELISA that more than or equal 10 and Control had negative IgM antibody. The results indicated that only some rice activities were significantly associated with leptospirosis infection: walking through water water (OR 4.8, 95% CI 1.7 - 13.7), plowing in wet area more than 6 hours a day (OR 3.5, 95% CI 1.1 - 11.6), fertilizing in wet areas for more than 6 hours a day (OR 2.7, 95% CI 1.1 - 6.6) and pulling rice sprouts in wet areas more than 6 hours a day (OR 4.4, 95% CI 1.7 - 11.3).

- Douglin CP, Jordan C, Rock R, Hurley A, Levett PN. 1997. Risk factors for severe Leptospirosis in Parishes of St. Andrew, Barbados. (Letter to the Editor). **EID.** 3(1): 78-80.

This article explains a case control study to identify risk factor in Barbados. Cases confirmed by IgM ELISA that more than or equal 160 and MAT more than or equal 800, a fourfold rise in Antibody titer, or isolation. The study used different proportions of male/female ratio in cases and controls which was the potential problem. Associated risk factors: Walking through ponds or stagnant water (OR 25.6, 95% CI 2.89-1151.84), gardening (OR 4.57, 95% CI 1.09-20.3) (irrespective if gloves were worn or not), Dog as pet (OR 7.82, 95% CI 1.79-46.55).

- Everard COR, Bennett S, Edwards CN, Nicholson GD, Hassell TA, Carrington DG, Everard JD. 1992. An investigation of some risk factors for severe leptospirosis on Barbados. **Journal of Tropical Medicine and Hygiene.** 95: 13-22.

This article states that there is a clear link between incidence cases and rainfall more than or equals 1600mm. Cases and control were not taken from the same rural area because controls were other hospitalized patients with other diseases which was a potential problem with study. Sugar-cane workers were 5 times more likely to become ill, people who managed livestock were 2.5 times more likely to become infected, and those people with rodents around their homes were 1.8 times more likely to become infected. Cases were determined using 22 live antigens representing 16 serogroups in MAT, ELISA using potoc and copenhageni strains, and MCA. Between the ages of

15-34, men were 9.6 times more likely to become ill than women, and incidence in men increased with age. No apparent seasonal difference was seen, but cases were double in traditionally wetter areas. And unusually high rainfall years infer more cases in 1981. However, this concordance was not true for the lowest incidence rate and the lowest rainfall year (less than 1600 mm). Positive correlation was found between incidence and rainfall in same month, not previous month ($p < .02$). Higher proportion of males in cases than controls, not matched for sex. No significant association between keeping dogs, gardening or walking barefoot.

- Katz AR, Manea SJ, Sasaki DM. 1991. Leptospirosis on Kauai: Investigation of a Common Source Waterborne Outbreak. **American Journal of Public Health.** 81 (10): 1310-2.

This article provides that swimming can be associated with leptospirosis infection. In this study, three patients were hospitalized (July 1987) with suspected Leptospirosis. All had swum in a river that animals graze in. Cows had been known to spontaneously abort offspring that same spring. Cases were confirmed by an individual with recreational exposure and a positive leptospiral culture or serologic evidence of recent infection by a minimal fourfold increase in MAT titres. Rodents were trapped and tested, water and mud samples were taken and cattle survey was done. Cases ranged from 10-24 years, which is lower than other studies. Rodents tested were negative, 64% of cattle tested were positive. Low numbers of rodents sampled does not justify exclusion. Identify pH levels to be slightly alkaline and water

temp to be 22 degrees or higher. Acknowledge the disadvantages of MAT testing and crossreactivity.

- Jevon TR, Knudson MP, Smith PA, Whitecar PS, Blake RL. 1986. A point-source epidemic of leptospirosis. **Postgraduate Medicine/Leptospirosis**. 80(8): 126-9.

This article shows the evidence of oral transmission in leptospirosis. A cluster of cases in Missouri from a contaminated creek. He had been kayaking in a creek 10 days before onset. Swallowed several mouthfuls of water. Three weeks after onset, MAT was positive for 5 serotypes 1:3,200 was the highest titre, for the djasiman and andaman A serotype. A friend of the 1st patient, 2nd patient had also been kayaking and ingested water, MAT 1:800 titre was positive for djasiman serotype. Four of ten people on kayak trip became ill, only two with laboratory confirmation. Heavy rains caused river to swell. Main point of report is that recreational point-source exposure is becoming more of a concern and changing the epidemiologic profile for leptospirosis. It was also mentioned that the antibiotics given to two of the patients may have made the serology negative.

- Trevejo RT, Rigau-Perez JG, Ashford DA, McClure EM, Jarquin-Gonzalez C, Amador JJ, et al. 1998. Epidemic Leptospirosis Associated with Pulmonary Hemorrhage-Nicaragua, 1995. **JID**. 178: 1457-63.

This article also states the risk factors associated with leptospirosis in the epidemic. Case control study was conducted to determine associated risk factors. Pulmonary hemorrhaging is another form of severe leptospirosis (without jaundice).

Significant risk factors include: walking in creeks (MOR 15.0, 95% CI 1.7-132.3), having household rodents (MOR 10.4, 95% CI 1.1-97.1), ownership of dog with titres more than or equal 400 to *Leptospires* (MOR 23.4, 95% CI 3.6-inf.). *Leptospires* were isolated from 26 of 51 either serologically or post-mortem. Cases were chosen based on hospitalization and clinical symptoms. They had fever, headache, musculoskeletal pain, chills, abdominal pain, respiratory distress, hemorrhagic manifestation or hypotension, and negative for malaria by blood smear. Controls were chosen from same town or outlying area and matched by age group (0-4, 5-14, more than or equal 15). Rodents were trapped and dogs were tested from the households of positively identified cases. Confirmed cases were identified as *Letospire*s species isolated from whole blood or urine, more than or equal 4-fold titre increase, demonstration of species through Indirect Haemagglutination Test, a titre of more than or equal 400 to one or more serovars. Age-specific data showed that people within the age group 1-14 had a significantly higher incidence, males and females were equally infected. The case group had many more males than the control group 54%, 31%, respectively. The case group also had a lower mean age 14.9 vs. 17.7. Increased exposure to flood water that was infected with urine. Many serovars were detected and disease associated with flooding. Urine from dogs played a major role in amplifying the level of environmental contamination. Assess the limitations of laboratory diagnosis in great detail. Emphasizes the need for future studies on the effectiveness of prophylaxis.

- Jackson LA, Kaufmann AF, Adams WG, Phelps MB, Andreasen C, Langkop CW, Francis BJ, Wenger JD. 1993. Outbreak of Leptospirosis associated with swimming. **Pediatr Infec Dis J.** 12:48-54.

This article emphasizes that swimming associates to leptospirosis infection. Five boys in a rural town in Illinois had an acute febrile illness that was diagnosed as leptospirosis. A cohort study found that the outbreak was associated with swimming in a pond. The attack rate was 28%, *Leptospire interrogans* serovar grippotyphosa was isolated from urine cultures of patients as well as from the pond. Conditions one month before the outbreak were drought-like. Animals around the pond were found to have a high seroprevalence. A case was defined as having a fever and at least 3 other compatible symptoms: headache, myalgia, chills, nausea, vomiting, stiff neck. A MAT titre of >1:100. Emphasizes the association between drought-like conditions and the outbreak. There was no association of a dose response that increased one's risk for infection.

- Anderson CD, Folland AS, Fox MD, Patton CM, Kaufmann AF. 1978. Leptospirosis: A Common Source Outbreak Due to *Leptospire* of the Grippotyphosa Serogroup. **American Journal of Epidemiology.** 107:538-43..

This article shows the swimming as the route to spread leptospirosis in outbreak situation. August 1-10, 1975, Seven cases of Leptospirosis occurred in a small City in Tennessee. Swimming at Cub Creek was implicated in the outbreak. Domestic livestock graze in the vicinity of the pond. Four males and 3 females ranged in age from 11-16. All 7 patients had serologic evidence of recent infection

with *leptospire*s of the grippotyphosa serogroup. Age-sex matched case control study found that only swimming in the creek was significant. One out of 25 cattle was positive for MA titer 1:100 for grippotyphosa.serogroup. Low rainfall in the preceding months made the creek level lower than normal.

- Cacciapuoti B, Ciceroni L, Maffei C, Stanislao FD, Strusi P, Calegari L, Lupidi R, Scalise G, Cagnoni G, Renga G. 1987. A Waterborne Outbreak of Leptospirosis, **American Journal of Epidemiology**. 126(3): 535-45.

This article emphasizes the oral transmission of leptospirosis. Outbreak from July 10-26 1984 in Central Italy, CFR=8.6% (3/35). Drinking fountain water is the suspected source of infection. 38 year old man died of septic shock, 36 hours after the onset of symptoms. An unusually huge number of febrile illness occurred in the area between these dates. Cases were identified as anyone with a febrile illness in the area that sought medical attention. MAT was done using 16 serovars, 1:1000 was considered a confirmed case (31). Urine samples were taken in the convalescent phase in 16 cases and inoculated into EMJH media and stored for 3 months, no + cultures. Ninety one percent of cases were male. Most patients had an abrupt onset of illness- fever, headache, nausea/vomiting, abdominal pain. 59.3% of hospitalized cases had evidence of jaundice or liver abnormality. Four patients had patchy lesions on their lungs, 1 deceased. Legionella infection was the first suspected cause of disease. Majority of cases worked outside and drank for a particular water fountain. (18 confirmed cases) Australis was the most common serovar. Unvaccinated cattle were tested and 10.1% had positive serology. A dead hedgehog was found at the bottom of

the reservoir that supplied water to the fountain. Rainfall data could not be obtained. Epidemic-curve typical with a common source outbreak, rapid onset and rapid decline. All deaths were anicteric and due to pulmonary distress.