

Original article

Leptospirosis among Royal Thai Army personnel participating in humanitarian aid missions during the 2011 major flooding Thailand

Kanlaya Jongcherdchootrakul and Ram Rangsin

Department of Military and Community Medicine, Phramongkutklao College of Medicine

Abstract:

Nowadays, flooding is one of the most frequent disasters worldwide. In 2011, Thailand was affected by flooding which caused devastating damages in terms of expenditure and health. In Thailand, the Royal Thai Armed Forces were usually responsible for providing humanitarian assistances in every disaster including this flooding. Leptospirosis outbreaks often occur after major flooding globally. In order to prepare for further upcoming flooding, we conducted a total survey of incidence and prevention measures of leptospirosis during the flooding among a military unit participating in the 2011 flooding humanitarian assistance. The questionnaires included job description during humanitarian aid, protective behavior, symptoms, and illnesses of leptospirosis. Moreover, the participants were tested for leptospira IgG and IgM using Indirect Immunofluorescence Assay technique. We found that the leptospirosis incidence among the study participants was 0%, which was comparable with other leptospirosis related studies (water samples and rodents) on this major flooding event in Thailand.

Keywords: ● Leptospirosis ● Incidence ● Flooding ● Thailand

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Corresponding Author: Kanlaya Jongcherdchootrakul, M.D., M.P.H., MSc., PhD, Department of Military and Community Medicine, Phramongkutklao College of Medicine, Rajvithi Rd., Ratchathewi District, Bangkok 10400 E-mail: kanpcm@gmail.com Phone number: 02-763-3619

นิพนธ์ต้นฉบับ

โรคฉี่หนูในกำลังพลกองทัพบกที่ปฏิบัติการกิจช่วยเหลือด้านมนุษยธรรม ในมหาอุทกภัยปี 2554

กัลยา จงเชิดชูตระกูล และ ราม รังสินธุ์

ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

บทคัดย่อ

ปัจจุบันอุทกภัยเป็นภัยพิบัติที่พบมากขึ้นทั่วโลก ประเทศไทยเป็นหนึ่งในประเทศที่ได้รับผลกระทบจากอุทกภัย ตัวอย่างเช่น มหาอุทกภัยปี 2554 ซึ่งก่อความเสียหายทั้งในด้านของทรัพย์สินและสุขภาพของประชาชนชาวไทย ในประเทศไทยกำลังพลกองทัพบกเป็นกำลังหลักในการปฏิบัติการกิจช่วยเหลือด้านมนุษยธรรมในเหตุการณ์สาธารณภัยรวมถึงอุทกภัย การระบาดของโรคฉี่หนูมักพบได้บ่อยหลังเหตุการณ์อุทกภัยทั่วโลก เพื่อการวางแผนรับมืออุทกภัยที่จะเกิดขึ้นในอนาคต การสำรวจอุบัติการณ์และมาตรการการควบคุมและป้องกันโรคฉี่หนูในกำลังพลกองทัพบกที่ปฏิบัติการกิจช่วยเหลือด้านมนุษยธรรมในมหาอุทกภัยปี 2554 จึงได้ถูกดำเนินการขึ้นแบบสอบถามเกี่ยวกับลักษณะงานที่ปฏิบัติ การสวมใส่อุปกรณ์ป้องกัน อาการและการป่วยโรคฉี่หนูได้ถูกนำมาใช้เก็บข้อมูล นอกจากนี้ผู้เข้าร่วมการศึกษายังได้รับการตรวจหาภูมิคุ้มกันต่อเชื้อเล็ปโตสไปราด้วยวิธีปฏิกิริยาอิมมูโนแอสเซย์โดยอ้อม ในการศึกษาครั้งนี้ไม่พบอุบัติการณ์ของโรคฉี่หนูในผู้เข้าร่วมการศึกษาซึ่งเข้าได้กับการศึกษาหาเชื้อเล็ปโตสไปราในตัวอย่างน้ำและสัตว์ฟันแทะที่ดำเนินการในห้วงมหาอุทกภัยปี 2554

คำสำคัญ: ● โรคฉี่หนู ● อุบัติการณ์ ● อุทกภัย ● ประเทศไทย

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ผู้นิพนธ์หลัก พ.ท.หญิง กัลยา จงเชิดชูตระกูล ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ถนนราชวิถี เขตราชเทวี กรุงเทพฯ 10400

E-mail: kanpcm@gmail.com โทร.02-763-3619

Introduction

Nowadays, natural disasters such as flooding and earthquake impacting people's health and belonging frequently occur and cause enormous negative impacts worldwide. Since July 2011, tropical storm Nock-ten triggered flooding in Thailand by increasing rainfall. The flooding affected a huge number of provinces in northern, north-eastern, and central Thailand. It persisted in some particular areas until mid of January 2012 and resulted in a total of more than 800 deaths and 14 million affected people.¹ This 2011 flooding was the worst flooding in the recent history of Thailand in terms of the amount of water and the number of affected people. Generally, a number of leptospirosis outbreaks during flooding have been reported in the past two decades.^{2,3} Urbanization and the increasing opportunity of contact between people and contaminated water were the main factors of those outbreaks.²

The Royal Thai Army (RTA) personnel usually provide humanitarian assistances in disaster emergency situations including the 2011 flooding. In fact, more than 50,000 RTA personnel participated in the mission. Therefore, the epidemiological information regarding leptospirosis among those army personnel would be useful for further humanitarian assistance preparedness in Thailand.

Materials and Methods

A cross-sectional study (total survey) was conducted among an anti-aircraft artillery division in Bangkok who participated in providing humanitarian aids during the 2011 flooding in Thailand. The study was conducted in February, 2012 which was around one month after the resolving of the flooding. The self-administered questionnaire was distributed to all personnel of the unit who participated in providing the humanitarian assistances. The questionnaire included four parts, namely, demographic data, job description during humanitarian

aids, protective behavior, and symptoms and illnesses. Ten mL of venous blood samples were obtained from participants for leptospira IgG and IgM testing using Indirect Immunofluorescence Assay (IFA) technique. The cut-point of the positive sample for leptospirosis was IgM or IgG titer more than 1:400. The study was approved by the Royal Thai Army Medical Department Institutional Review Board. Written informed consents were obtained from the participants.

Results

All of the participants ($n = 407$) were male, aged 35.0 ± 12.8 years old (mean \pm SD). A total of 66.2% of the participants were non-commissioned officers and 31.3% were conscripts. Almost all of the participants (98.0%) were Buddhism. Fifty-six percent three percent was married and 78.1% had hometown in Bangkok and the central region of Thailand. Additionally, 19.9% and 2.5% of them reported a history of underlying diseases and drug allergy, respectively.

The participants from this army unit were assigned to provide assistances mainly in Bangkok and Vicinity. The main responsibility was transferring affected people and their belongings to designated areas. Regarding the job assignments during humanitarian aids, we found that, 82.0% of them reported contacting with floodwater. They spent 4.5 hours per day in average during the missions. Moreover, the median duration of their mission was 40 days.

In terms of personal protections of the participants during the assignments involved with floods, most of the personnel wore only long pants (91.9%) and sport shoes (89.1%). Additionally, the Royal Thai Army Medical Department recommended the use of doxycycline chemoprophylaxis for leptospirosis. However, most of the participants neither were aware of this information (79.6%) nor received any chemoprophylaxis during the mission (93.0%).

It should be noted that there was no leptospirosis case via self-reported from questionnaire. It correlated with the data from leptospirosis surveillance system from data of the Royal Thai Army Medical Department. The laboratory results showed that all of the participants had leptospirosis IgM and IgG titer using IFA technique lower than 1:100 at baseline, and also during the follow-up periods. Additionally, there was no four-fold rising of leptospirosis IgM and IgG at the second blood draws approximately 14 days after the baseline. In summary, incidence of leptospirosis among this Royal Thai Army personnel was 0%.

Discussion

Leptospirosis outbreaks after flooding were reported in India 2005⁴, Laos 2006⁵, Indonesia 2002⁶, and Thailand 2006⁷. However, the number of leptospirosis cases between June 2011 and January 2012 from the disease surveillance system of Bureau of Epidemiology, Ministry of Public Health Thailand was similar with the median of the last 5 years in particular flooding areas⁸. Similarly, the relationship between leptospirosis and this flooding was not indicated in spatio-temporal pattern⁹. Both information demonstrated the same result with our study of no relationship between increasing of leptospirosis cases and this 2011 flooding. During the same flooding events, there were supporting information from environmental and reservoir studies for leptospirosis. Thaipadungpanit J et al. reported that only one from 79 floodwater samples collected from Bangkok and Nakorn Patthom, a province nearby Bangkok, was shown positive pathogenic *Leptospira*¹⁰ and 1.5% (4/270) of rodents that were trapped was shown positive PCR for pathogenic *Leptospira*¹¹. Therefore, we concluded that there was no leptospirosis outbreak in 2011 flooding, Thailand.

Possible explanations of the contradictory results on the negative finding of leptospirosis during the major flooding in Thailand may be from some reasons. Considering the environmental aspect, Bangkok Metropolitan is an urban area which usually had a higher risk of leptospirosis due to a large number of rodents. However, the extremely high volume and huge surface area of floodwater^{9,12}, which is considered to be non-suitable environment for *Leptospira*^{13,14}, would deflate the concentration of *Leptospira* in the floodwater. According to the host factors, some studies reported that working five hours and greater in floodwater increased risk of leptospirosis^{15,16}. In addition, appropriate personal protection such as wearing shoes and long pants probably prevented the risk of leptospirosis infection¹⁷. In terms of the pathogen (*Leptospira*), floodwaters in this major flood event were from northern and central regions of Thailand where the number of reported leptospirosis was relatively low⁸. Additionally, the majority of the serogroups of *Leptospira* found in the central part of Thailand were less virulence than the others^{8,18}. It should be noted that these two reasons reduced the risk of leptospirosis outbreak in this flooding.

The main limitation of this study was that only a military unit participating in the 2011 flooding humanitarian assistances contributed their information to the study. Therefore, further study should include more representative study population in order to generate more precise information. However, we use the most accurate diagnosis for leptospirosis that would give precise leptospirosis incidences among our study population by reducing the effect of the variety of leptospirosis manifestations. In conclusion, there was no leptospirosis case found among Royal Thai Army personnel participated in humanitarian aids 2011 flooding, Thailand.

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