Expanding distributions of red back spiders and bites in Japan from 2011 to 2013

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Abstract: In Japan, fourteen bites by the red back spider, Latrodectus hasseltii, were reported in four hospitals between 2011 and 2013 in a survey of sentinel hospitals. The distribution of the spider and the areas in which patients were bitten by the spider both expanded geographically each year. Although fatalities or severely ill patients are yet to be reported in Japan, stockpiles of the antivenom and communication with the public and medical professionals should be considered.

Key words: Red back spider, spider bite, Japan

The red back spider, Latrodectus hasseltii, is one of the medically significant widow spiders (Isbister and White, 2004) that is found in diverse habitats in many countries (Shahi et al., 2011). The localized symptoms of a red back spider bite are pain, itchiness, and diaphoresis, and systemic symptoms include nausea, vomiting, headache, and malaise. In Australia, red back spider bites are common, with an estimated number of at least 5,000 cases each year (Isbister and White, 2004), and a fatal case was reported (Braitberg and Segal, 2009). Although the antivenom is often used for pain relief (Isbister et al., 2014) in Australia, the antivenom is still unapproved drug in Japan. Those unapproved drugs must be imported by each clinicians under the Pharmaceutical Affairs law. According to inquiry in 2012, only five hospitals in Mie, Osaka, Okinawa and Fukuoka were reserved antivenom for severe cases (Seiwa sangyo, 2013). In Japan, since the discovery of the spider in Osaka in 1995 (Nihei et al., 2004), red back spiders have been identified in 34 prefectures in Japan from northern Honshu to Okinawa Island by 2014 (IIRG, 2006; Ori et al., 1996). Currently, over 80 envenomation cases were report since its first identification, with the antivenom administered to six patients (IIRG, 2006). However, as these reports were from specific areas, it is not clear how much areas are affected by red back spider and its bites in Japan. Thus, we conducted a survey against 470 sentinel hospitals for other disease to determine how red back spider and the patients with its bite spread geographically, and how many antivenum are used in Japan.

The sentinel hospitals, as defined, were designated by local government, served a population of 75,000, and had 300 beds or more. The survey was conducted from January to March 2014, and collected information on the prefecture of the hospital, the number of beds, and the numbers of spider bites and red back spider bites, whether the patient was admitted, use of antivenom and fatality. We used reports from academic meetings, papers, and websites of local governments to identify prefectures in which the red back spider was found from 2011–2013. Approval for ethical protocols was not required.
because this study did not use private information and was conducted for the purpose of public health response.

A total of 297 hospitals responded to the questionnaire (response rate of 63%, 297/470, all prefecture; 33.3–100%, positive prefecture of red back spider, 2011; 33.3–88.9%, 2012; 33.3–88.9%, 2013; 33.3–100%). The average number of beds per hospital was 429. No significant difference was found between those hospitals that submitted the questionnaire and those that did not (432 beds on average, t-test: \( p = 0.91 \)). Twenty-one hospitals reported patients with spider bites from unknown species, and spider bites were reported for 59 patients between 2011 and 2013 (Table 1). Four hospitals reported a total of 14 patients with red back spider bites between 2011 and 2013; one prefecture in 2011 and 2012 and four prefectures in 2013 (Table 1 and Fig. 1). The number of prefectures in which red back spider was found increased from 21 in 2011 to 29 in 2013. Only one patient (7%) required hospitalization because of severe symptoms from a bite; however, that patient recovered without antivenom.

The distribution of red back spider and the areas in which red back spider bites occur are expanding in Japan. After the spider was first introduced into Japan two decades ago, red back spiders are now found in approximately half of 47 prefectures in Japan. Red back spider appears to be adapting to the environment in Japan, and more spiders and spider bites are expected in the near future. This problem may become more serious in Japan due to its dense population. Although the symptoms are not severe and fatal cases are rare (Isbister and Gray, 2003), preparation for the occurrence of severe cases is required as the distribution and number of bites increase. The antivenom is widely used in Australia, although its effectiveness has not been clearly established (Isbister and Gray, 2003). Because the number of patients was low and no severe cases were found in Japan, it was not necessary to have the antivenom available throughout the country until recently. Whilst maintaining stockpiles of antivenom in designated places in Japan would be prudent given the increasing risk of bites, the safety of the antivenom must be evaluated in Japan due to its possible side effects (Isbister et al., 2014). Although the red back spider was highlighted in the Japanese media recently, there are people who cannot identify the spider. Furthermore, not all medical professionals can diagnose red back spider bites. Thus, information on the red back spider, including the risk of bites, appropriate local acute care hospitals and the current domestic epidemiology, should be communicated to the public. In some prefectures, red back spiders have been exterminated; however, the cost effectiveness of such pest control required evaluation.

The results of this survey must be interpreted in recognition of several limitations. First, the number of patients bitten by red back spiders might be underestimated because this study was conducted using only sentinel hospitals. Moreover, cases could be missed because the bites were not reported or not recognized, particularly for those who had mild symptoms or did not seek medical attention. Second,
the diagnoses of red back spider bites were not confirmed because spiders were only identified in some of the reported cases.

In conclusion, the distribution of the red back spider and the number of patients with reported bites expanded recently in Japan. In preparation for the future increase in red back spider bites, antivenom stockpiles and communication with the public and medical professionals should be considered, and the cost effectiveness of pest control evaluated.

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