

Rickettsia tsutsugamushi in Nagasaki Prefecture

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Abstract: 584 healthy inhabitants of seven different areas in Nagasaki prefecture, namely Nagasaki city, Shimabara city, Fukue city, Oseto town, Wakamatsu town, Arikawa town and Shinuonome town, were examined for antibody to *Rickettsia tsutsugamushi* by the immune peroxidase method using Gilliam strain as antigen. The IgG antibody positive rates ranged from 2.0 to 60.0 percent. The IgG antibody rate at Arikawa town and Shinuonome town was significantly higher than that at other five areas. In addition the level of IgG antibody distribution in these two areas was significantly higher than the other areas. Furthermore IgM antibody was detected only at these two areas. These results indicated that two areas among seven areas investigated were endemic areas for *Rickettsia tsutsugamushi*.

Key words: *Rickettsia tsutsugamushi*, Immuno peroxidase method, Seroepidemiology

INTRODUCTION

Before 1976 the occurrence of *Rickettsia tsutsugamushi* (*R. tsutsugamushi*) in Japan was limited mainly to Akita, Niigata and a few other prefectures. However, since 1977, infections due to a new strain of *R. tsutsugamushi* have not only been on the increase but have also spread into new areas (Otsuru, 1984). In Nagasaki prefecture there were no reports of *R. tsutsugamushi* infections from 1950 to 1982 (Health Department of Nagasaki Prefectural Government, 1984). In 1982 and 1983 five and eight patients, respectively, who met the clinical and the serological criteria for diagnosis of *R. tsutsugamushi* were reported in Nagasaki prefecture (Health Department of Nagasaki Prefectural Government, 1984). The cases were sporadic and occurred at different areas. So, the present study was performed to identify *R. tsutsugamushi* endemic areas in Nagasaki prefecture.

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MATERIALS AND METHODS

Samples. Five hundred and eightyfour blood samples were collected from healthy inhabitants of Nagasaki prefecture during routine annual medical examination. Of the 584 subjects, 120 resided in Nagasaki city, 50 in Shimabara city, 50 at Oseto town, 50 at Fukue city, 44 at Wakamatsu town, 210 at Arikawa town and 60 at Shinuonome town (Fig. 1). The age of the study group for Nagasaki city ranged from 20 to 80 years. For the other areas it ranged from 40 to 86 years. Sera from subjects at Nagasaki city, Shimabara city, Oseto town, Fukue city and Wakamatsu town were taken from the beginning of December 1983 to the end of January 1984 and those at Arikawa town and Shinuonome town were taken in December 1984. All sera were stored at -20°C until use.

Immune peroxidase method. Antibody to *R. tsutsugamushi* were examined by the method described by Suto (1983). The Gilliam strain of *R. tsutsugamushi* was used as antigen. Peroxidase-labeled goat IgG and IgM fraction against human immuno globulins were commercial preparations from Tago Inc. Salingame Ca. USA.

Antibody level. Two fold serial dilution (beginning with a dilution of 1:20) were prepared using phosphate buffered saline with 0.3 percent bovine serum albumin. Sera with antibody titers of 1:20 or more were considered positive.

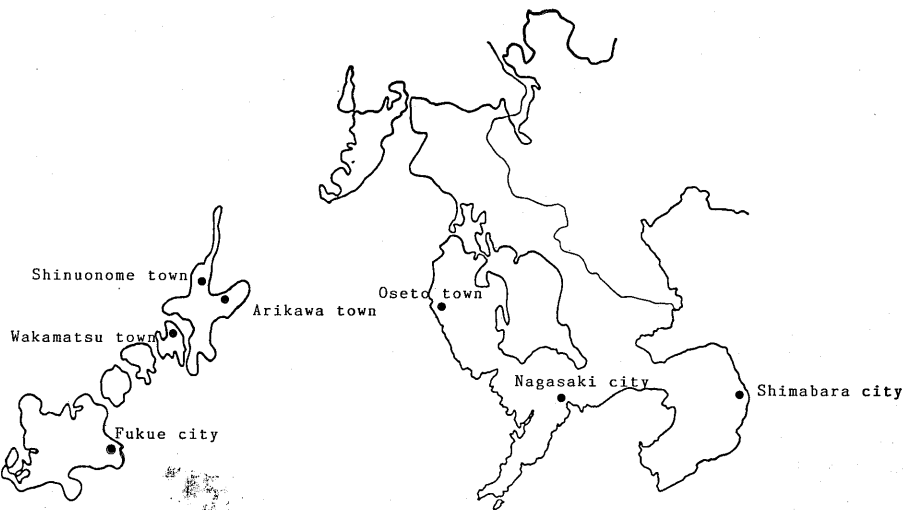


Fig. 1 Map of Nagasaki prefecture.

RESULTS

Positive rate.

The IgG antibody positive rates ranged from 2.0 at Shimabara to 60.0 percent at

Shinuonome towns. These data are shown in Table 1. The rate at Arikawa and Shinuonome towns were significantly (χ^2 -test) higher than that at the other five areas (Fig.2). There was no significant difference in the antibody rates between the remaining four areas.

IgG antibody distribution.

The IgG antibody distribution was as shown in Fig. 3. The antibody level at areas with significantly higher positive rate (Arikawa and Shinuonome towns) ranged from 1:20 to 1:1280. For the areas with lower positive rates (Nagasaki city, Shimabara city, Oseto town, Fukue city, Wakamatsu town) the IgG antibody levels were in all cases less than 1:80. The level of antibody distribution at areas with higher positive rate was significantly

Table 1 Positive rate of *Rickettsia tsutsugamushi* in Nagasaki Prefecture.

Locality	No. of samples	No. of samples with	
		IgG antibody	IgM antibody
Nagasaki city	120	7 (5.8)	0
Shimabara city	50	1 (2.0)	0
Oseto town	50	4 (8.0)	0
Fukue city	50	2 (4.0)	0
Wakamatsu town	44	2 (4.5)	0
Arikawa town	210	103 (49.0)	9 (4.3)
Shinuonome town	60	36 (60.0)	15 (25.0)

The numbers in parentheses expressed percentage.

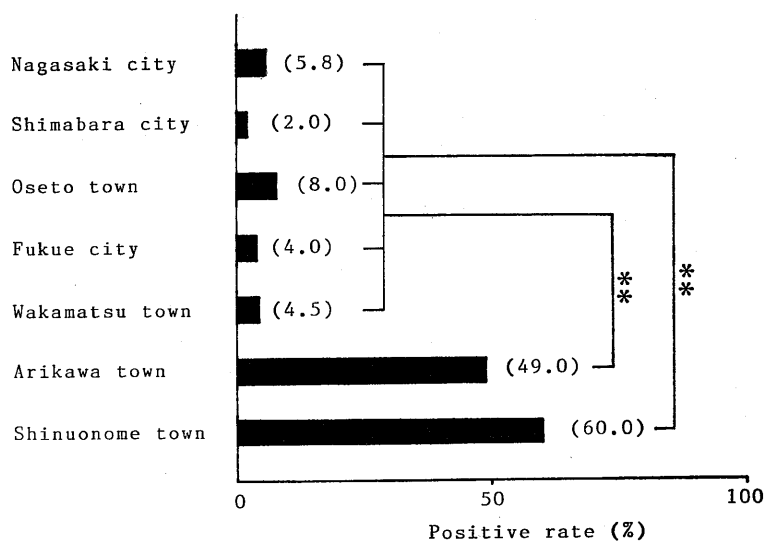


Fig. 2 Positive rate of *Rickettsia tsutsugamushi* at each area in Nagasaki prefecture. **: Significant at the level of 1%. Statistical calculation was done by χ^2 -test.

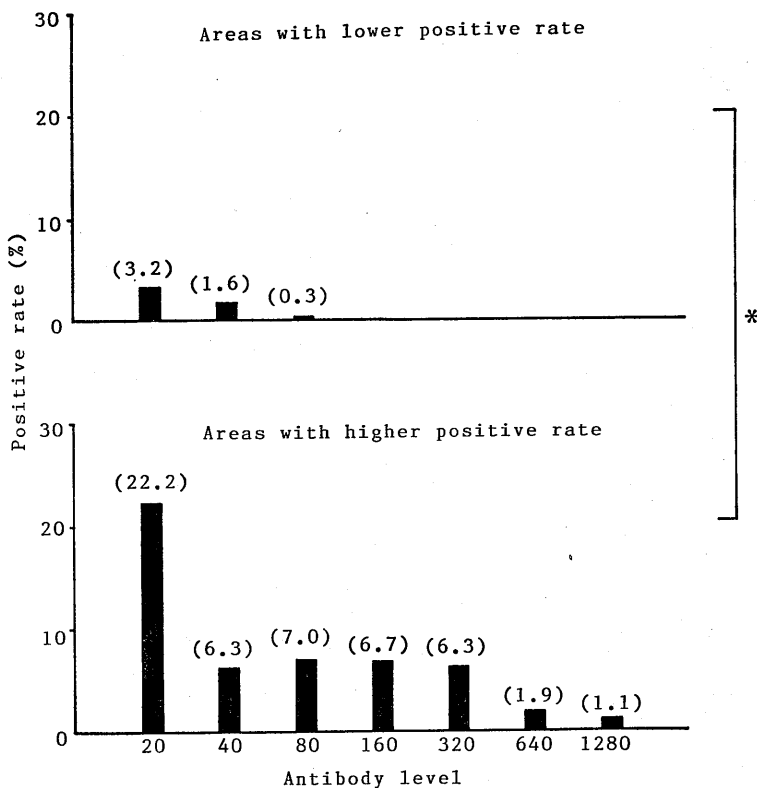


Fig. 3 Antibody distribution of *Rickettsia tsutsugamushi* at areas with higher or lower positive rates in Nagasaki prefecture. *: Significant at the level of 5%. Statistical calculation was done by Wilcoxon test.

higher by Wilcoxon test than that at areas with lower positive rate.

IgM antibody.

As shown in Table 1, the IgM antibody was detected only at Arikawa (3.8 percent) and Shinuonome towns (16.7 percent). In these cases the IgM antibodies were positive at dilutions of 1:20 only (data not shown).

DISCUSSION

The *R. tsutsugamushi* antibody rates for 2 areas, which were Arikawa town and Shinuonome town, were significantly higher than that for other 5 areas. In addition significant distribution of IgG antibody was detected in sera from Arikawa and Shinuonome towns. Furthermore, from the same towns *R. tsutsugamushi* IgM antibodies were also detected from samples. These results are consistent with both recent and a high rate of *R. tsutsugamushi* infection.

The IgG antibody rates of 49 percent (Arikawa town) and 60 percent (Shinuonome

town) are similar to those reported for endemic areas in Japan (Kawamura *et al.*, 1980; Otsuru, 1984). Thus Arikawa and Shinuonome towns are endemic areas for *R. tsutsugamushi*. On the other hand, the rates of 2 to 8 percent for the remaining 5 areas hitherto thought to be free of *R. tsutsugamushi* indicate that the endemic zone has spread to involve these areas. The relatively lower antibody rates (compared to Arikawa and Shinuonome) suggest a lower rate of infection in the five areas. Our data therefore, indicate that Nagasaki city, Shimabara city, Fukue city, Oseto and Wakamatsu towns are low endemic areas for *R. tsutsugamushi*. The cases of scrub typhus reported in 1982 and 1983 (Health Department of Nagasaki Prefectural Government, 1984) from several areas in Nagasaki prefecture should therefore be viewed as further evidence of spreading of *R. tsutsugamushi* from endemic zone into these areas. It should be realized however, that the blood samples for the present study were collected from people living in cities or towns. Unlike in smaller towns and villages waste land suitable for habitation of rodents is scarce or absent in the cities. This may account for the lower IgG antibody rates observed in the major cities. Although our data indicate that Nagasaki city, Shimabara city, Fukue city, Oseto and Wakamatsu towns are low endemic areas, it does not rule out the possibility of the country side around these cities being high endemic areas. To explore this possibility, sera from people living in the country side will need to be screened.

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長崎県各地におけるリケッチャ・ツツガムシ抗体陽性率

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1982年以降, 長崎県内においてもつつがむし病の散発的発症例が報告されるようになった。そこで, 長崎県内におけるリケッチャ・ツツガムシによる汚染地を調べるために, 各地(長崎市, 島原市, 福江市, 大瀬戸町, 若松町, 有川町, 新魚目町)のいわゆる健康人を対象として, リケッチャ・ツツガムシに対する抗体を測定した。尚, 抗体は抗原としてギリウム株を用いた immune peroxidase 法により IgG および IgM 抗体が測定された。各地における抗体陽性率は

2% (島原市) から60% (新魚目町) に分布していた。地域間の比較では、新魚目町と有川町の抗体陽性率と抗体分布レベルが他の地域よりも有意に高く、さらに、これらの2地域の対象のみから IgM 抗体が検出された。そこで、長崎県内においては、調査した7地域のうち2地域がリケツチア・ツツガムシによる汚染地であると推定された。

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