Research Journal of Microbiology

ISSN 1816-4935

Academic
Journals Inc.

www.academicjournals.com

Research Journal of Microbiology 5 (4): 366-371, 2010
ISSN 1816-4935 / DOI: 10.3923/jm.2006.95.100

Seroprevalence of Leptospirosis among Jarwas-a Hunter-gatherer Primitive Negrito Tribe of Andaman and Nicobar Islands, India*

[1]Sameer Sharma, [1]Paluru Vijayachari, [1]Attayoor P. Sugunan,
[1]Kalimuthusamy Natarajeseenivasan, [2]Manoj V. Murhekar and [1]Subhash C. Sehgal
[1]Regional Medical Research Centre, (Indian Council of Medical Research),WHO Collaborating Centre for Diagnosis, Reference, Research and Training in Leptospirosis, Post Bag No. 13, Port Blair 744 101, Andaman and Nicobar Islands, India
[2]National Institute of Epidemiology, Mayor V R Ramanathan Road, Chetpet, Chennai-600 031, Tamil Nadu, India

Abstract: The Jarwa, one of the four Negrito tribes of these islands, inhabit the west coast of the South and Middle Andamans district have been living in isolation for several centuries and recently they started coming out of the jungles shedding their hostility. Since than several disease outbreaks have been reported in these classical tribe. An attempt was made to screen the sera collected during one such outbreaks showed the prevalence of leptospirosis in these tribes. MAT, IgM and IgG ELISA were used for the detection of Leptospiral antibodies among Jarwas samples. Among 40 sera samples collected during a febrile out break, 40% of the samples showed antibodies against leptospirosis by MAT. Icterohaemorrhagiae was the major serogroup for the cause of leptospirosis among Jarwas and was followed by Hebdomadis and Pyrogenes. The highest titre observed was 1:320 against serogroup Icterohaemorrhagiae. IgM ELISA showed a seroprevalence rate of 20% where as IgG ELISA showed a prevalence of 63%. The highest titre observed for I gM ELISA was 1:320 and for IgG it was 1:160. The environment of the jungle where they live in is favorable for survival of leptospirosis and their association with domestic and wild animal has to be studied which could be one of the source for acquiring leptospiral infection.

Key words: Leptospiral antibodies, negritotribes, leptospirosis, icterohae morrhagiae

INTRODUCTION

The Andaman and Nicobar Island, a Union Territory of India, are the summits of a submarine mountain range lying on the greater tectonic suture zone that extends from the eastern Himalayas along the Myanmar border to the Arakan and finally to Sumatra and lesser sundaes. Andaman and Nicobar Islands are situated in the Bay of Bengal, about 1200 Km east of the Indian sub-continent is the home to six tribal populations (Jarwas, Onges, Shompens, Nicobaries, Great Andamanese and Sentinelese) (Fig. 1). Out of these Great Andamanese, Onges, Jarwas and Sentinelese are of Negrito race and Nicobarese and Shompens of Mongoloid race. The Negrito tribes in Andaman Islands are probably the most primitive communities in India. The total population of Jarwas, Onges, Shompens, Nicobaries, Great Andamanese and Sentinelese are 275 (Kumar, 1999), 100 (Basu, 1990), 214 (Rizvi, 1990), 26, 852 (Murhekar *et al*., 2003), 29 (Chakraborty, 1990) and 80-100 (Pandit, 1990), respectively.

Corresponding Author: S.C. Sehgal, Regional Medical Research Centre (ICMR), Post Bag No. 13 Port Blair-744 101, Andaman and Nicobar Islands, India
Tel: 03192-251158, 251043 Fax: 03192-251163

*Originally Published in Research Journal of Microbiology, 2006

Fig. 1: Settlement areas of different tribes in Andaman and Nicobar Islands

The present estimate of the Jarwa population is 275. They inhibit about 700 sq Km of the western coastal and forest reserve of South and Middle Andaman Islands. For several years (till recently) they maintained a stance of defensive/offensive isolation from Port Blair and other non-tribal settlements. Because of their hostility and unfriendly relations with non-Jarwas, very little is known about this small classical hunter-gatherer tribe. In the last five-six years, Jarwas have come out of their habitat shedding their hostility and are mixing with the non-Jarwa population. As they have come in contact with the outside world, they are likely to be exposed to a variety of infectious diseases of modern world. There have been reports various febrile illness like measles (Kumar, 1999), mumps community-acquired pneumonias and malaria have been reported amongst them.

The Andaman Islands were known to be endemic for leptospirosis since the early part of the twentieth century (Taylor and Goyle, 1931). Recent sero-surveys have shown that Andaman Islands are endemic to leptospirosis with seroprevalence up to 55% among general population. Sero-epidemiological and follow-up studies carried out in different population groups further supported that these islands are endemic for leptospiral infection (Sehgal *et al*., 1999; Singh *et al*., 1999). As Andaman Island is endemic for leptospirosis and the status of this infection was not known in Jarwa tribe, a study was planned with an idea to know about the prevalence of the disease in this tribe.

MATERIALS AND METHODS

Blood samples collected from 40 Jarwas aged 15 years or more, (30 males and 10 females) during the febrile out break suspected for malaria. The study was approved by the Scientific Advisory Committee and the Ethics Committee of our Centre (Regional Medical Research Centre, Port Blair). The test of significance was performed using Chi-square test.

Laboratory Procedure

Serum was separated from blood samples and stored at -70° until processed. Sera samples were tested for the presence of anti-leptospiral antibodies Using Microscopic Agglutination Test (MAT) following standard procedures (Faine *et al*., 1999). Reference strains belonging to twelve serogroups common in Andaman Islands and country were included in MAT panel as antigens. These includes Australis (serovar Australis, strain Ballico), Autumnalis (serovar Autumnalis, strain Rachmati), Bataviae (serovar Bataviae, strain Swart), Canicola (serovar Canicola, strain Hond Utrecht IV), Grippotyphosa (serovar Grippotyphosa, strain Moskva V), Icterohaemorrhagiae (serovar Icterohaemorrhagiae, strain RGA), Hebdomadis (serovar Hebdomadis, strain Hebdomadis), Pomona (serovar Pomona, strain Pomona), Sejroe (serovar Hardjo, strain Hardjoprajitno), Ballum (serovar Ballum, strain Mus 127), Cynopteri (serovar Cynopteri, strain 3522C) and Pyrogenes (serovar Pyrogenes, strain Salinem). The antigens used were 5-7 days old auto-agglutination free cultures grown in Elinghausen McCullough Johnsion Harris (EMJH) medium (DIFCO, USA) with approximately $1\text{-}2\times10^{8}$ organisms mL^{-1}. MAT was done at doubling dilutions starting from 1 in 25. Positive samples were titrated up to end titres. A titre of 1in 50 or more against any of the serovars was considered as evidence of leptospiral infection (Faine *et al*., 1999).

I gM and IgG ELISA were performed with using standard procedure (Terpstra *et al*., 1985) with some modifications. Heat extracted antigen prepared from leptospiral strain Patoc 1 of serovar Patoc of serogroup Sameranga was coated in polystyrene microtitre plates (Natarajaseenivasan and Ratnam, 2001). A titre of = 1:80 was considered as significant.

RESULTS

Out of the 40 samples collected and tested for leptospirosis by MAT, anti-leptospiral antibodies against one of leptospires were found in 16 samples with an overall sero-prevalence rate of 40%. The commonest serogroup found was Icterohaemorrhagiae (25%) followed by Hebdomadis (8%), Pyrogenes (5%) and Hardjo (2.5%) (Table 1). None of the seropositive samples from Jarwas showed mixed reactions. The highest titre observed was 1:320 against the serogroup Icterohaemorrhagiae (Table 2).

Among the 40 samples collected 8 were positive by IgM ELISA giving a prevalence of 20% and 26 were positive by IgG ELISA with a sero-prevalence of 65% in titres ranging from 1: 80 to 1:320.

DISCUSSION

Leptospirosis is a well-known worldwide zoonotic disease and is emerging as an important public health problem in India and other developing countries. Although, it is considered as an occupational hazard of agricultural workers, sewage workers, forest workers, veterinarians etc. (Sehgal *et al*., 1995) whole communities living in tropical regions with a wet environment could be at risk (Murhekar *et al*., 1998). Leptospirosis is highly endemic in Andaman Islands with more than half of the population

Table 1: Distribution of different serogroups of leptospires among seropositive Jarwas

Serogroup	Jarwas (n = 16)
Icterohaemorrhagiae	10 (25%)
Pyrogenes	2 (5%)
Hebdomadis	3 (8%)
Hardjo	1 (2.5%)

Note: n is the total number of positives among the Jarwas samples

Table 2: Distribution of MAT titres among seropositive animals in Andaman and Nicobar districts

Titres	Jarwas (%) (n = 40)
Negative	24 (60)
40	5 (12.5)
80	3 (7.5)
160	4 (10)
320	5 (12.5)

Note: n is the total number of Jarwas samples

exposed to leptospires (Sehgal *et al*., 1995; Sharma *et al*., 2003). The disease occurs in the form of seasonal post-monsoon outbreaks with considerable mortality in the population.

The findings of the present study indicate that the prevalence of leptospirosis is high among the primitive tribes when compared to the study conducted on other tribe likes Nicobarese were the seroprevalence was 19% (Sehgal, 1999). The over all seroprevalence rates among all the tribes other than shompens (53.5%) taken together was much less than the prevalence rates observed among the Jarwas. Any type of contact with animals pose the risk of acquiring leptospiral infection, in most instances it is acquired through environment contaminated with infected animal urine (Terpstra *et al*., 1985). The most important factor for the survivability of leptospires is the suitable environment, which determines the risk of leptospiral infection. All the tribes are closely related with dogs, pigs and cattle but very little is known about the habitat of Jarwas except for their delicacy towards pork and are closely related with dogs. But the environments the tribe lives differ from tribe to tribe. Like Nicobarese they live near the sea in small Island called Nicobar. The soil is sandy with lower water retaining capacity and thus there is very little stagnation of water. The chances of survival of leptospires in this dry soil are negligible. As the environment in Nicobar may not be suitable for the survival of leptospires, the chances of human beings contracting the infection directly or indirectly are less. This could be a reason for the lower prevalence of leptospiral infection observed in Nicobarese tribe.

In contrast, the seroprevalence in the Jarwas is a reflection of the overall problem of the leptospirosis both in mainland populations and animals (Sehgal *et al*., 1995; Sharma *et al*., 2003) in Andaman Islands. The middle and south Andaman have an undulating topography with mountains, hillocks and valleys. Jarwas mostly live deep inside jungles and settlement areas in most of the islands are in the basins surrounded by hills. The prolonged monsoon fills the basins with water and even after the end of the monsoon the soil remains wet for most part of the year. This environment facilitates the survival of leptospires and acts as a vehicle for transmission of infection, maintaining and probably amplifying the source of infection. This could be one of the reasons for higher seroprevalence among Jarwas tribe.

Icterohaemorrhagiae was the commonest serogroup found among Jarwas sample. This is also one of the most common circulating serovar in Andaman Islands. We have different isolates from different animal species (unpublished data) from Port Blair and sub-urban areas and their serological and molecular characterization indicates it to belong to serogroup Icterohaemorrhagiae. This is an indication

towards their association with animal species like dogs or pigs or cattle. A detailed study is further required to know about their association.

MAT is a serovar specific test and detects both IgM and IgG antibodies and it is difficult to say whether it is a current infection or past exposure to leptospires using single MAT. So IgM ELISA was performed and showed 20% positivity out of 40 samples collected from Jarwas. As the sample collected for investigation of malaria during a febrile out break there is most likely hood of some people were suffering from leptospirosis. IgG showed 63% positivity among the Jarwas. This shows their past exposure indicating their continuous exposure towards leptospires. This study is a preliminary report about the seroprevalence of leptospirosis among the Jarwas. In future a detailed study to be conducted to find out exact mechanism of the transmission of leptospires and the association of the carrier animals in transmission of leptospirosis to these primitive tribes.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the help and cooperation extended by the Director of Health Services, Andaman and Nicobar Islands. Thanks are due to Mr. Paritosh Dey, Mr. Hamza, Miss Jyoti, Mrs. Veena and Mr. Kamesh for their technical assistance.

REFERENCES

Basu, B.K., 1990. The Onge. In: Singh, S.K. Ed. 1st Edn., Calcutta: Seagull Books, pp: 4-5.

Chakraborty, D.K., 1990. The Great Andamanese. In: Singh, S.K. Eds. 1st Edn., Calcutta: Seagull Books, pp: 1-13.

Faine, S., B. Adler, C. Bolin and P. Perolat, 1999. Leptospira and leptospirosis. In: Faine, S. Ed. Methods. 2nd Edn., Melbourne: Med. Sci., pp: 169-184.

Kumar, S., 1999. Jarawas threatened by measles outbreak. Lancet, pp: 354.

Murhekar, M.V., A.P. Sugunan, P. Vijayachari, S. Sharma and S.C. Sehgal, 1998. Risk factors in the transmission of leptospiral infection. Indian J. Med. Res., 107: 218-223.

Murhekar, M.V., K.M. Murhekar and S.C. Sehgal, 2003. Alarming prevalence of hepatitis-B infection among the Jarwas-a primitive Negrito tribe of Andaman and Nicobar Islands. India J. Viral Hepatitis, 10: 232-233.

Natarajaseenivasan, K. and S. Ratnam, 2001. Relative superiority of IgM+IgG combined conjugate plate ELISA for detection of anti leptospiral antibodies among different occupational groups. Indian J. Anim. Sci., 71: 1142-1144.

Pandit, T.N., 1990. The Sentinelese. In: Singh, S.K. Ed. 1st Edn., Kolcutta: Seagull Books, pp: 12-13.

Rizvi, H.S.N., 1990. The Shompen. In: Singh, S.K. Ed. 1st Edn., Kolcutta: Seagull Books, pp: 1-7.

Sehgal, S.C., M.V. Murhekar and A.P. Sugunan, 1995. Leptospirosis with pulmonary involvement in North Andamans. Indian J. Med. Res., 102: 9-12.

Sehgal, S.C., P. Vijayachari, M.V. Murhekar, A.P. Sugunan, S. Sharma and S.S. Singh, 1999. Leptospiral infection among primitive tribes of Andaman and Nicobar Islands. Epidemiol. Infect., 122: 423-428.

Singh, S.S., P. Vijayachari, A. Sinha, A.P. Sugunan, M.A. Rasheed and S.C. Sehgal, 1999. Clinico-epidemiological study of severe cases of leptospirosis in Andamans. Indian J. Med. Res., 109: 94-99.

Sharma, S., P. Vijayachari, A.P. Sugunan and S.C. Sehgal, 2003. Leptospiral carrier state and seroprevalence among animal population-a cross-sectional sample survey in Andaman and Nicobar Islands. Epidemiol. Infect., 131: 985-989.

Taylor, J. and A.N. Goyle, 1931. Leptospirosis in Andamans. Indian Medical Research Memoirs, Supplementary series to the Indian Journal of Medical Research. Indian J. Med. Res. Memoir No., 20: 55-56.

Terpstra, W.J., G.S. Lighthart and G.J. Schoone, 1985. ELISA for the detection of specific IgM and IgG in human leptospirosis. J. General Microbiol., 131: 377-385.