DISTRIBUTION OF JAPANESE ENCEPHALITIS VIRUS VECTOR (CULEX SPECIES)


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ABSTRACT

Japanese Encephalitis virus (JEV), a mosquito-borne flavivirus which is endemic in many Asian countries including India, is transmitted to humans through the bite of an infected mosquito, particularly of culex species. A study was under taken to detect the prevalence of these vectors in different settings which include farm settlement (cattle, sheep, pig), human settlement (hostel, laboratoy) and interface (human + farm settlement). Mosquitoes collection was made between sunset and sunrise using unbaited light trap. The mosquitoes were collected and identified based on morphological characteristics. A total of 5399 mosquitoes were collected from the month of January to April from different settings of Chennai. The prevalence of culex spp. mosquitoes recorded from different settlements areas follows cattle (87.28%), sheep (84.79%), pig (88.37%), Interface (85.36%), laboratory (100%) and hostel (97.39%). The overall prevalence of culex spp. is 87.89%. This study emphasis the continued risk of human exposure to Japanese encephalitis virus mosquito vector.

Keywords: Japanese encephalitis virus, transmission, mosquitoes, culex spp, exposure

Introduction

Japanese Encephalitis (JE) is a mosquito borne flaviviral encephalitis. The disease has been observed in large parts of Asia and recently in the Western Pacific region (OIE, 2010). In India it was first recognized in 1955 from North Arcot District of Tamilnadu. Since 1972, epidemic outbreaks have been reported from West Bengal, Uttar Pradesh, Assam, Bihar, Manipur, Pondicherry, Karnataka, Goa, Kerala and Maharasthra.

Japanese encephalitis virus (JEV) exists in an enzootic cycle between mosquitoes and vertebrate hosts such as pigs and birds (Gubler et al., 2007). Pigs are the major amplifier and reservoir for JEV. In animals like horse and pig it causes fatal encephalitis and reproductive losses i.e., still birth and abortion. Other animal species it causes sub-clinical infection only.

JE is transmitted by Culex mosquito particularly of Culex vishnui subgroup consisting of Cx. tritaeniorhynchus Giles, Cx. vishnui Theobald and Cx. pseudovishnui Colless have been implicated as major vectors of JEV. However in India, JEV has been isolated from 16 species of mosquitoes (Annual Report, 2005-06), in which 10 are from Culex, three from Anopheles, and three from Mansonia mosquitoes (Murty et al., 2010). Culex genus is quite diverse, with well over a thousand species in which several species serve as vectors of important diseases.

The main environmental factors such as global warming (Chaves et al., 2008), deforestation, availability of hosts, changing human behavior (Renshaw et al., 1994), the domiciliary surroundings
with adjacent water bodies, unplanned urbanization, close proximity to animals, high temperature and humidity are found affecting the behavior of mosquitoes and thereby enhancing increase risk of vector borne pathogens transmission. The incidence of disease increases in rainy season both in tropical and temperate climate (Saxena et al., 2009). JEV is not only a rural concern as has traditionally been claimed (Mackenzie et al., 2004). The local climate of Chennai is suitable for survival and reproduction of mosquitoes and conducive to the sustained transmission of arboviruses. This study shows the distribution of mosquito populations in Chennai city.

**Materials and methods**

**Study area:**

Tamil Nadu is located at the southern region of India it covers an area of 130,058 km2, and is the eleventh largest state in India. Chennai is the capital of the state and also one of the metropolitan's cities of India. Six different settings of Chennai which include farm settlement (cattle, sheep, pig), human dwellings (hostel, laboratory), and interface (farm + human dwelling) were selected for the study.

**Mosquito collection:**

Mosquitoes were collected from dwellings by using light traps (12V, 300mA). Traps were put from dusk (5:00pm) to dawn (9:00am). Captured mosquitoes were killed by freezing at -20o C for at least 40 minutes. Specimens were placed on chilled plate, and species were identified by using morphologic characteristics (Reuben et al., 1994).

<table>
<thead>
<tr>
<th>Different settings</th>
<th>Prevalence of culex spp. from (January- April)</th>
<th>Overall prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle farm</td>
<td>87.28%</td>
<td>87.89%</td>
</tr>
<tr>
<td>Sheep farm</td>
<td>84.79%</td>
<td></td>
</tr>
<tr>
<td>Pig sty</td>
<td>88.37%</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>85.36%</td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Hostel</td>
<td>97.39%</td>
<td></td>
</tr>
</tbody>
</table>

**Result and discussion**

In this study a total of 5399 mosquitoes were collected from the month of January to April from different settings of Chennai on weekly basis. Mosquitoes obtained from different settings belong to culex spp., anopheles spp., aedes spp. and other spp group. Out of which 4745 numbers belongs to culex spp. group only. The prevalence of culex spp. mosquitoes from January to April recorded from cattle farm was (87.28%), sheep (84.79%), pig (88.37%), interface (85.36%), laboratory (100%) and hostel (97.39%). The result reveals that Culex spp. was the predominant of all and it account for about 87.89% (Table 1). Figure 1 show the culex species of mosquitoes prevalence in different areas, month wise.

Lindahl et al, (2012) also reported the most prevalent vectors were from Culex spp. group which include Culex tritaeniorhynchus (36%), Cx. gelidus (24%), and Cx. quinquefasciatus (15%), from Can Tho City, Vietnam. Culex tritaeniorhynchus and Cx. gelidus comprised 60% of the mosquitoes collected. Thenmozhi et al, (2014) reported Culex quinquefasciatus as the most predominant species in indoor and outdoor collection.

The local climate characteristics are suitable for survival and reproduction of mosquitoes and conducive to the sustained transmission of arboviruses. Because of its high prevalence in many areas and its predilection for human and animal blood, this species may have a potential for the dissemination of human diseases caused by virus.
Conclusion

Present study is of public health concern as there is abundance of JEV vector species in all the collection site. The present study calls for further studies investigations on the ecology and vector potential. A multi-pronged strategy is needed to be adopted for prevention of JE outbreaks in endemic areas.

References

Annual Report for the year 2005-06, Indian Lac Research Institute, Namkum, Ranchi.


