A Study on Vector Borne Diseases Control (MALARIA) in anantapuramu city

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ABSTRACT
Mosquito-borne diseases, including malaria, Japanese encephalitis (JE), lymphatic filariasis and dengue, are major public health concerns in the Andhra Pradesh, deterring equitable socioeconomic and industrial development. Among these, malaria and JE are the predominant infections and are spread across the state. The incidence of malaria is, however, gradually receding, with a consistent decline in cases over the past few years, although entry and spread of artemisinin-resistant Plasmodium falciparum remains a real threat in the country. Control of these diseases requires robust disease surveillance and integrated vector management on a sustained basis, ensuring universal coverage of evidence-based key interventions based on sound epidemiological data. This paper aims to present a comprehensive review of the status of vector borne diseases in Andhra Pradesh and to address the key challenges. One of the most common problems associated with the poorly designed landfills and poorly managed solid waste is that it leads to attraction of large number of vectors such as female Anopheles, which is responsible for the proliferation of breeding sites of mosquitoes causing Vector borne diseases such as Malaria. The present study was carried out through survey and conducted for about 250 houses in six prone areas of vectors in Vijayawada. These areas mainly included Lakshmi nagar, subhash road, old town, chandrababu naidu kottal, Rani nagar, kakakalapalli areas around government hospital etc. Here identification of vectors was carried out in fresh water, drains, drainage using sampling techniques. This helped in detection of mosquitoes. Subsequently control measures were carried out in peri-domestic places.

Keywords: Malaria, Vector, born disease, Anopheles.

ARTICLE INFO

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ARTICLE HISTORY: Received 20 May 2018, Accepted 28 June 2018, Available Online 27 July 2018

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1. Introduction

Vector-borne diseases, including malaria, Japanese encephalitis (JE), lymphatic filariasis, and dengue/chikungunya, continue to plague tropical countries globally. These diseases cause considerable illness and mortality in India, where over 1 billion people are living at risk of infection, contributing the majority of cases in the World Health Organization (WHO) [1-5]. Despite accumulated knowledge on disease epidemiology and additional inputs under the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), these communicable diseases continue to inflict ill health and deter equitable socio-economic development across India. Andhra Pradesh is currently witnessing rapid ecological changes, owing to unprecedented population growth on account of human migration, urbanization and environmental degradation; this creates opportunities for vector proliferation and increased receptivity [6-7]. Given the health infrastructure and interventions for disease management, malaria, JE and lymphatic filariasis continue to persist, while dengue is a relatively recent introduction and emerging as a public health concern in Andhra Pradesh, with imminent threat to the other north-eastern states of India. This paper aims to present a comprehensive overview of the present status of vector-borne diseases, with major emphasis on malaria using unpublished data from the state disease surveillance.

Malaria

Malaria is a major public health problem in Andhra Pradesh. All districts are co-endemic for Plasmodium falciparum and P. vivax. The transmission intensities vary across districts and are estimated to be low to moderate. P. falciparum is the predominant infection and is solely responsible for a high proportion of cases and attributable deaths. Transmission of the causative parasites is typically perennial, with a high rise in cases during April to September, corresponding to the wet season/months of heavy rainfall. Cases were also recorded in other months of the year (dry season) but the intensity of transmission was less marked [10-11]. This transmission pattern was quite consistent but trends showed a clear and steady decline each year, evidenced by a substantial reduction in the number of cases. However, the number of reported cases may be minuscule in comparison to the actual disease burden, which includes many more unreported/undiagnosed/misdiagnosed cases and those treated in the private/public sector, which are normally not captured by the state surveillance. Furthermore, there is a huge asymptomatic reservoir (estimated to be 8–33% of ethnic communities), for which there is no mechanism for case detection and treatment [12].

Today, elimination of malaria is feasible with scientific approaches as envisaged by WHO. The main components of the strategy comprise case surveillance; ensuring early diagnosis using rapid diagnostic kits and/or microscopy; vector control by indoor residual spraying and LLINs; and treatment with evidence-based artemisinin-based combination therapy. There are other supportive elements of community participation and awareness programmes that use information, education and communication to prevent creation of habitats for vector proliferation; strengthening public health services for improved access to treatment and monitoring of artemisinin resistance; prevention of malaria invasion from the neighboring states/countries; and resource mobilization, which should all be applied in keeping with the global plan for an artemisinin-resistance containment programme, to prevent the drug resistance parasites [12]. One of the most common problems associated with the poorly designed landfills and poorly managed solid waste is that it leads to attraction of large numbers of vectors such as female anophelines, which is responsible for causing diseases such as Malaria [18]. A survey was conducted for about 250 houses in six prone areas of vectors in Lakshmi nagar, Adarsh nagar, guzar peta, chandrababu naidu kottal, rani nagar, kakkalapalli areas around government hospital etc. Anantapuramu. These areas mainly included (10° 47’40.56″ N, 78° 41’ 6″ E) Andhra Pradesh, India. Anantapur district lies at the slight right bottom of Andhra Pradesh. The district has an area of 19,130 square kilometers penna river flows through the length of the district and is the principal source of irrigation and water supply. The annual rainfall in the region is about 520 mm and is contributed to by the Southwest monsoon. The main hill range of the district known as Googudu runs between Bukkaraya samudramu in Anantapuram with a length of about 20 km.

2. Materials and Methods

Larval Collection: During the survey, all the containers and reachable tree holes. Larvae collection was carried outdoors by dipping, using pipette or dipper depending on container type and location. In this study, “outdoor” refers to the outside of building but confined to its immediate area. The number, type and water condition of containers which serve as a potential breeding site was examined and recorded using container index (CI). Number of container positive Container index index = × 100 Number of container inspected. The collected larvae and pupae were kept in the laboratory for adult emergence. The emerged adult mosquitoes were then pinned and identified.

Mosquito larvae sampling and identification:

To collect mosquito larvae, one to ten dip samples were taken from each habitat using a standard 350 ml dipper (Clarke Mosquito Control Products, Roselle, IL) depending on the habitat size. Mosquito larvae were also sampled using 5 ml graduated pipettes from water bodies, which were too small to use standard dippers. For small habitats such as hoof prints, several hoof prints were pooled to get the required sample volume.

Mosquito predator and competitor sampling and identification: A rectangular frame net (30 × 20 cm) with a mesh size of 250 m was used to sample mosquito predators and competitors at the same sampling sites where mosquito larvae sampling was carried out. Each collection entailed 10 minute kick-sample with a hand net over a distance of 10 m in the habitats that were sufficiently large.

Identification of Collected Larvae: The collected specimens were preserved in plastic vials for further identification. Immature forms of mosquito larvae were collected by dipper method [8], reared in metal trays in the laboratory and fed with larval feed.
**Vector Control Measures**

1. **Source reduction**
2. **Anti larval activities**
   a) **Biological**
   b) **Chemical**
3. **Anti Adult mosquito measures**
   a) **Indoor spray**
   b) **Outdoor spray**
4. **Health education on protection**

**1) Source Reduction:** To void water stagnations by filling low lying areas. It is carried out in two ways
   1. Elimination or reduction of breeding sites primarily involving engineering methods.
   2. Environmental manipulation.

   Elimination or reduction of breeding sites This aspect of source reduction are divided into
   a) Filling has been done on minor scale for elimination of
      burrow pits, ditches, small unused irrigation canals
      unused/abandoned wells
   b) Garbage was used infilling of drains. This included
      mainly domestic and
      industrial waste.
   c) Sanitary land fill method was carried out dumping a layer
      of refuse/garbage in a selected area followed by earth cover
      daily after compaction

   **2) Anti Larval Activities:**

   **Biological:** Released Gambusia fish in all medium and
   large fresh water bodies to remove mosquito larvae.
   Gambusia full grown fish eats about 100 to 300 mosquito
   larvae per day. Gambusia is a surface feeder; hence it is
   suitable for feeding on both anopheles and culicines. It
   frequents the margins of the water container, pond or other
   ground water collections, except where there is dense
   vegetation at the margins of the water body. Mosquito traps
   A light trap that attracts and captures mosquitoes. A
   traditional approach to controlling mosquito populations
   is the use of lethal ovitraps, which provide artificial
   breeding spots for mosquitoes to lay their eggs. These traps
   usually contain a chemical inside the trap that is used to kill
   the adult mosquito and/or the larvae in the trap. The
   Insecticides like DDT 50%, Malathion 25%, M.L.O are used
   in control of vector Female Anopheles. About 1kg of
   DDT, 2kg of Malathion, 0.004kg of M.L.O are used to
   prepare 10 liters of suspension. This has 10 to 12 (DDT), 6
   to 8 (Malathion), 10-12 (M.L.O) As Residual effects in
   weeks. The Dosage
   per square Metre of active Ingredient are 1gram, 2gram,
   20mg for DDT, Malathion & M.L.O respectively. The
   Frequency of application is weekly for all these Insecticides.

   **3) Anti Adult Mosquito Measures:**

   **A) Indoor Spray:**

   **Indoor Residual Spray:** Conducted malathion 25% solution spray on the surface of the walls of every house existing in high risk areas of vector borne diseases like Malaria Dengue, Filaria etc.

   **Pyrethrum space spray:** Conducted Pyrethrum indoor space spray in all the houses situated in and around of Malaria and Dengue cases and high risk areas for the control of vector borne diseases.

   **B) Out Door Spray:**
Table 1: Observations

<table>
<thead>
<tr>
<th>Name of the Vector</th>
<th>Vector Borne Disease</th>
<th>Causative Agent</th>
<th>Breeding areas</th>
<th>Feeding Habits</th>
<th>Characteristic of Larvae</th>
<th>Life Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Anopheles</td>
<td>Malaria</td>
<td><em>Plasmodium Vivax</em>, <em>P. Falciparum</em></td>
<td>Drains, Drainage Stagnant Water, Peri-domestic Places</td>
<td>It is a zoophilic species When high densities build up relatively large numbers feed on men</td>
<td>It lays 150-200 eggs It can travel up to 1 kms White in color and Submerged inside the water</td>
<td>30 days</td>
</tr>
</tbody>
</table>

Table 2: Malaria control in First Week

<table>
<thead>
<tr>
<th>Areas of Malaria Vector</th>
<th>PV</th>
<th>PF</th>
<th>Identified</th>
<th>Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>RANI NAGAR</td>
<td>35</td>
<td>1</td>
<td>36</td>
<td>29</td>
</tr>
<tr>
<td>CHANDRA BABU NAIDUKOTTALA</td>
<td>47</td>
<td>1</td>
<td>48</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 3: Malaria control in Second week

<table>
<thead>
<tr>
<th>Areas of Malaria Vector</th>
<th>PV</th>
<th>PF</th>
<th>Identified</th>
<th>Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAKKALAPALLI</td>
<td>43</td>
<td>0</td>
<td>43</td>
<td>37</td>
</tr>
<tr>
<td>PRABHAKAR CHOWDARY COLONY</td>
<td>33</td>
<td>1</td>
<td>34</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 4: Malaria control in Third week

<table>
<thead>
<tr>
<th>Areas of Malaria Vector</th>
<th>PV</th>
<th>PF</th>
<th>Identified</th>
<th>Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>GULZAR PETA</td>
<td>49</td>
<td>1</td>
<td>50</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 5: Malaria control in Fourth week

<table>
<thead>
<tr>
<th>Areas of Malaria Vector</th>
<th>PV</th>
<th>PF</th>
<th>Identified</th>
<th>Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADARSH NAGAR</td>
<td>40</td>
<td>0</td>
<td>40</td>
<td>32</td>
</tr>
</tbody>
</table>

4. Conclusion

However, there are many more challenges that remain to be addressed to qualify for pre-elimination specific to Andhra Pradesh. To enumerate a few, the problem of asymptomatic malaria (parasite reservoir in the community) remains unattended, leaving many cases untreated and inadequate vector-control interventions along international/interstate borders; this requires priority action to achieve a substantial reduction of transmission. In addition, Andhra pradesh is the major contributor for P. falciparum malaria that has become multi-resistant, and treatment of this remains a continuing challenges. Among all type of containers surveyed, cement cistern (59.25%), mud pot (53.84), tyre (42.85), unused well (33.33), plastic container and vessels (25%) were positive for the mosquito larvae. The collected mosquito larvae included Female Anopheles Vectors. The source reduction is an effective way for the community to manage the populations of many kinds of mosquitoes The eradication of mosquito breeding containers or breeding sites in and around living, working areas should be taken into consideration, since the presence of water in containers is probably the most important factor in determining the breeding of Anopheles mosquitoes, especially a result, mosquito control programme should be established at krishna district. Such a programme would reduce the risk to both animals and human, and hence prevent the development of disease motivations in surrounding locations.

5. References


