EVALUATION OF COMMON POTENTIAL BREEDING SITE FOR ADES AGYPTI IN DISTRICT SWAT

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ABSTRACT

Objectives: *The aim of this study was to identify potential breeding sites.*

Methods and materials: *It was a descriptive study conducted in August-September 2019. Secondary data (2018) of indoor and outdoor vector were analyzed to identify common potential breeding sites. Breteau Index (BI), house index (HI) and Container index (CI), were calculated using WHO standard formulae.*

Results: *During out door surveillance; stagnant water was found the most common breeding site (n=169, 33%) while the least common site was leaking water taps (n=4, 0.8%). Other common sites were water tanks which were 18% (n=93) followed by used tires 17% (n=87), water drums 13% (n=67), Garbage utensils 9% (n=46) and flower pots 4.4% (n=7). During indoor surveillance water drums were the most common potential breeding site (n=414, 45%) while water plats for birds were the least common site (n=4, 0.4%). Other common sites were water tanks 19% (n=178) followed by Flower pots 13.5% (n=124), garbage utensil 13.2% (n=121), leaking water tap 4.4 % (n=41), used tires 2.5% (n=23) and stagnant water 1% (n=10) Breteau index (BI) was 0.06, house index (HI) was 0.47 while Container index (CI) was 0.069.*

Conclusion: *Mechanical destruction of the all the positive potential breeding sites found in this study can easily be managed requiring no additional cost and technical expertise. Therefore, mass awareness about mechanical destruction of the potential breeding sites may play elementary role in dengue fever prevention.*

Key words: *Ades Agypti, vector surveillance, potential breeding sites, Breteau index, house index, Container index*

INTRODUCTION

Vector born disease is one of the most significant threat to public health throughout the globe[1]. Dengue fever is caused by virus which is transmitted by female Ades Agypti mosquito and causes dengue fever and dengue hemorrhagic fever. In severe cases dengue shock syndrome may occur[2]. Dengue fever is endemic in various countries like Africa, united states, south asia, and the western Pacific, and is a risk for more than 2.5 billion people[3]. 50–100 million dengue cases reported from countries on risk, annually[4]. World Health Organization (WHO) estimates more than five million hospitalization and twenty thousand deaths every year[5]. In tropical countries dengue fever outbreaks are a huge burden on the finance of public health and health systems[6].

In 1994 first outbreak of dengue fever was reported in 1994 in Karachi and now it is endemic

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throughout the country[7]. Outbreaks are reported time to time from all four provinces of Pakistan. In 1995 outbreak was reported from Baluchistan. In 2005 and 2006 again outbreaks were reported from Karachi. In 2008 dengue fever outbreak was reported from Punjab mainly Lahore was affected[8]. In 2013, and onward Khyber Pakhtunkhwa province was affected.[2] In district swat of Khyber-Pakhtunkhwa more than nine thousand suspected dengue fever cases were reported during the outbreak with thirty-eight (38) expiries.

In Pakistan the common risk factors for dengue fever are overcrowded population, lack of clean drinking water and inadequate sanitation and hygiene[9].

Ades Agypti and ades albopictus are the vectors responsible for the transmission of dengue fever virus into human. In spite of the epidemiological importance of vector borne diseases, limited work has been published on the vectors aspect of mosquitoes including ades. Therefore, developing techniques to destroy larva habitats of Ades mosquitos is an essential component of dengue control programs[10]. Aedes aegypti and Aedes albopictus prefer containers like old tires, flower pots, water tanks, buckets and general trash for lying eggs and larva and pupa development.[6] Storage of water for long period in houses, collection of rain water inside and outside houses and humidity in the air provide ideal breeding sites for the ades Agypti.[1]

Pakistan stands among the countries having heights burden of dengue fever. Vector surveillance is important component as for as prevention and control of the dengue fever is concerned. There is the dearth literature which explains the breeding site and control of larva and pupa.

This study provides the statistics regarding common potential breeding sites for the development of ades larva and pupa and will help to develop a comprehensive strategy for the dengue fever prevention at larva and pupa level. The entomological surveillance for the ades larva will also help in the prediction of outbreak and timely response.

MATERIALS AND METHODS

A descriptive cross-sectional study in August-September 2019 was conducted in district Swat of Khyber-Pakhtunkhwa. Analysis of secondary data was conducted which was collected from eleven high risk union councils located in the center of capital city of Mingora. These Union councils were badly affected by dengue fever outbreak in 2013 and in the subsequent years dengue fever cases were mainly clustered in these union councils. Analysis of complete one year (2018) indoor and outdoor vector surveillance data was done. During outdoor vector surveillance in 2018 total 448458 sites were checked and 508 were found positive for ades larva, while during indoor surveillance in the same year,1309969 potential breeding sites were checked in 158215 houses and 3724 were found positive for ades larva. All these data were included for analysis. Before the study, permission was taken from the focal person for dengue control in the office of district health officer district swat. The data received from the district health office were used only for this study.

RESULT

Data were entered into Microsoft excel 2010 to determine the frequency and dispersal of Ades larvae. By using WHO standard formulae; Container Index, House Index and Breteau Index were calculated[11].

While conducting indoor surveillance for ades larvae, total 915 potential breeding sites were found positive. Drums (n=414, 45%) were found the most common potential breeding site during indoor surveillance. Water tanks were the second most common breeding site found positive (n=178, 19%). Flower pots and garbage utensils were the third most common breeding sites i.e. n=124 (13.5%), n=121

Table 1: Container Index (CI) = Total positive containers for ades larva / total container checked X 100

Total positive containers	Total containers checked	Container Index (CI)
898	1298233	0.069

Table 2: House Index (HI) = Total houses positive for ades larva / Total houses checked X 100

Total positive houses	Total houses checked	House Index (HI)
695	147732	0.47

Table 3: Breteau Index (BI) = Number of positive containers /total number of houses checked X 100

Number of positive containers	Total houses checked	Breteau Index (BI)
898	147732	0.60

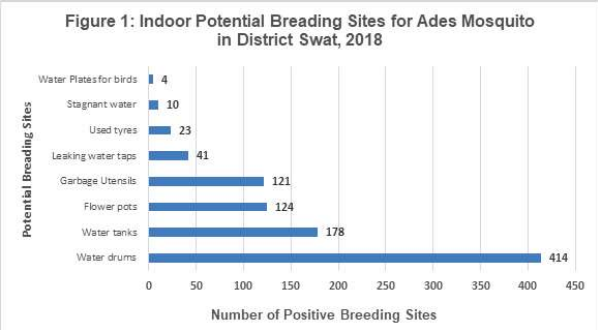

Fig 1: Indoor Potential Breading Sites for Ades Mosquito in District Swat, 2018

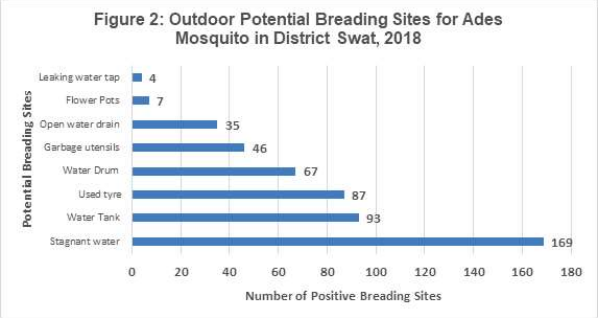

Fig 2: Outdoor Potential Breading Sites for Ades Mosquito in District Swat, 2018

(13.2%). Other potential breeding sites found positive were leaking water taps 4.4% (n=41) used tires 2.5% (n=23), stagnant water 1% (n=10) and water plats for birds 0.4% (n=4). (Figure 1).

DISCUSSION

Dengue fever has been endemic now throughout the Pakistan and may raise the number of reported cases above the threshold and convert to the outbreak situation depending upon the favorable environmental and weather conditions. Prevention of these outbreaks is highly dependent upon the development of proper preventive strategies and its implementation. The results of this study show all the positive sites of ades larvae in indoor and outdoor can easily manageable without very high expenses. The management of the source reduction has also been recommended by university of Florida in 2003[12]. The most common potential indoor breeding sites in this study found were water drums, water tanks, flower pots and garbage utensils. The management of these potential sites can be done on simple intervention to prevent dengue fever outbreak. In a study by Ana Paulo conducted in Mozambique, the most common breeding site found was used tires, pots for flower, disposed cans, cement tanks, buckets and bottles. The results of the both the study is almost the same[13]. And almost the same sites were found positive for the ades larvae with a bit variation in percentages of the specific containers.

In this study the positive potential breeding sites were divided into two types i.e. indoor and outdoor. The reason for this distribution was the operations which were devised during the surveillance. The female teams (lady Health Workers) were given the responsibilities for visiting inside the houses and checking the potential breeding sites, while male teams were responsible for outdoor checking of the potential breeding sites as male were not allowed the visit inside the houses due local culture. In outdoor surveillance the highest number positive sites found were stagnant water while in the study of Ana Paulo the used tires have the heights amount of positivity[14]. In indoor site the stagnant water was on the 7th number having only 1 % contribution to the total positive breeding sites. Second most common potential breeding sites were water tanks in both outdoor and indoor. The same is also stated by Ana Paulo study[14]. Used tires were the third highest number of positive breeding sites in outdoor. Various garbage utensils were found positive in both outdoor and indoor, which includes used bottles, used cans, plastic wrappers and other utensils. Like Ana Paulo study, this study also found that flower pots has the smaller number of positivity for Ades larvae. Unlikely to the Ana Paulo study this study found that garbage utensils have contributed 46% to the total positive sites while in their study it has 18 % contribution. Another study conducted in Malaysia has stated garbage utensils as the most common breeding sites for the ades larvae[14]. However this study was conducted in a university campus; a very limited location. The result of a large level community-based study may have the different results.

The high number of positive drums used for water storage and water tanks were due to inadequate and timely water supply. Each household have to store the water for their routine use as the timely water supply is not sure. The same results were given by an Indian study in which describes that cement water tanks, drums and other water storage containers have the heights positivity rate for the ades mosquito larva[15]. Same is for the stagnant water which has the highest positivity rate for ades larva is due to not proper sanitation system. In rainy

seasons the rain water collected in the open-air pools may provide the best habitat to the ades mosquitoes. The same was also conclude by Ana Paulo study in Mozambique and Higa Y[14,16].

Along with poor management of water supply and sanitation system; unplanned urbanization in the Mingora city of district swat may also one the important factor which can increases the risk of potential breeding sites.

Old automobile tires are commonly used in the district swat. These tiers are re-used and frequently sold along the main public highways, where they usually remain exposed sunlight rain fall for long periods. The rain water stored in these tiers provide an excellent habitat to the ades mosquitoes.

CONCLUSION

The positive potential breeding sites found in this study can be destroyed mechanically without the additional cost and technical expertise. Therefore, awareness sessions for the general public regarding mechanical interventions is recommended. Covering of the old tires indoor and outdoor will decrease chances of provisions of habitat to the Ades Agypti for the breeding. Covering of the drums, water tanks and other water storage containers will decrease chances of mosquito breeding. Improved water supply system if installed will decrease water storage in the houses thus habitat for ades will be decreased

Proper sanitation system development may decrease outdoor stagnant water and fast flow of rainy water will decrease breeding site for ades.There is a dire need of implementing vector surveillance for control and prevention of dengue fever.

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