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Original Research Article

ASSESSMENT OF DENGUE PREVENTION PRACTICES AMONG RESIDENTS OF NORTH KERALA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Dengue fever, a mosquito-borne viral disease spread by *Aedes egypti* mosquito has become significant public health challenges globally, especially in developing countries like India. During 2023 epidemic in North Kerala, a total of 3175 cases and 17 deaths were reported.

Objectives: This study aims to assess the level of awareness, analyze personal prophylactic measures and environmental factors in prevention of dengue among residents of North Kerala.

Materials and Methods: A cross-sectional survey is conducted among 100 households to assess the dengue prevention practices. Data is collected through a structured questionnaire. Surveys were conducted to assess the level of awareness, personal prophylactic measures adopted, biological and chemical controls applied and environmental factors and source reduction methods deployed among residents of North Kerala. Statistical analysis is used to identify the gaps in awareness and correlation between preventive measures and the incidence of disease.

Results: The study revealed that while 82% of households were aware of dengue, only 63% could identify key symptoms. Personal prophylactic measures such as mosquito net usage (31%) and practices like wearing protective clothing (12%) were limited, but use of repellents like coils and vaporizers are common. Potential mosquito breeding sites were found in 59% households, mainly in open water containers and discarded items. Despite 90% households storing water only 60% covered containers adequately. Community participation in dengue prevention activities were low with only 25% engaging in awareness campaigns and clean-up drives. These findings highlight gaps in preventive practices, vector control measures and community engagement of dengue.

Conclusion: The study highlights significant gaps in preventive practices, vector control measures and community engagement of dengue. Despite high awareness of dengue, mosquito breeding sites persist in many households due to improper water storage and waste management practices. The findings underscore the need for improved public health initiatives, stronger community engagement and better sanitation practices to effectively reduce the risk of dengue transmission in this region.

Keywords: Dengue fever; awareness; prevention; mosquito; public health; Kerala; environmental factors.

INTRODUCTION

Dengue is a viral infection transmitted to humans through the bite of infected mosquitoes. About half of the world's population is now at risk of dengue with an estimated 100-400 million infections occurring each year.[1] Dengue fever is a substantial emerging and reemerging arboviral virus in tropical and subtropical areas that seriously threatens public health worldwide. India is experiencing rising dengue epidemics in urban and rural regions linked to all four serotypes.[2] Unfortunately, there is no specific treatment approach, but prevention, adequate awareness, diagnosis in the early stages of viral infection and proper medical care can reduce the mortality rate.[3] In 2023 outbreak in North Kerala over 3175 cases and 17 deaths were reported.[4]

North Kerala, with its tropical climate and heavy monsoon rains, provides an ideal breeding ground for *aedes* mosquito, the primary vector of the disease. Factors such as unplanned urbanization and poor water, sanitation and hygiene practices, climate change are facilitating rapid geographical spread of dengue.[5] *Aedes* is a small mosquito, a day biter, which breeds in any type of man-made containers having even a small quantity of water. Eggs of *aedes* can live without water for more than one year.[6] Given that *Aedes egypti* has developed resistance to most insecticides, has diverse and inaccessible larval habitats, and has tolerance to desiccation of eggs, the eradication of this vector is not feasible. This disease is highly significant as it can cause serious problems in various health, social, economic and political dimensions. Therefore, necessary preventive measures are required due to the spectrum of diseases transmitted by it and the fundamental problems and the involvement of the health sector and the lack of sufficient facilities which necessitates community engagement.[7]

Aims and objectives: This study assess the level of awareness, personal prophylactic measures adopted such as use of mosquito repellent creams, use of bed nets; biological controls like use of larvivorous fishes in tanks, use of chemical larvicides in big breeding containers and environmental factors such as detection and elimination of mosquito breeding sources, proper covering of stored water and sanitation practices among residents of North Kerala.

MATERIALS AND METHODS

A community-based cross-sectional survey to assess the level of awareness, analyze personal prophylactic measures and environmental factors in prevention of dengue in residents of dengue endemic areas including urban and rural communities in three districts of North Kerala. A total of 100 households were randomly selected for the survey. Households were selected based on their willingness to participate in the study, residing in the districts of Kozhikode, Malappuram and Kannur of North Kerala for at least six months to ensure familiarity with local dengue prevention practices. Unwillingness to continue cooperation, incomplete questionnaire response and those with physical or cognitive impairments that prevented them from completing the questionnaire were excluded. Additionally, individuals currently diagnosed with dengue or other febrile illnesses were excluded to avoid biases in assessing regular preventive measures. This approach ensured a representative sample of the community while maintaining the focus on general prophylactic practices.

Data were collected using a structured questionnaire (according to the updated guidelines of WHO and Ministry of Health) comprising printed questions and administered to 100 households in North Kerala. The questionnaire was developed to gather information on the level of awareness, personal prophylactic measures adopted, biological and chemical controls applied and environmental factors and source reduction methods deployed in prevention of dengue among residents of North Kerala. Trained researchers visited each household, purpose of visit was explained and conducted a face-to-face interview with an adult member, ensuring representation of household practices and perspectives on dengue prevention. Additionally, researchers conducted environmental observations to identify potential mosquito breeding sites, water storage practices and the presence of preventive measures like mosquito nets and repellents.

Data Analysis: The collected data were systematically reviewed, coded and analyzed using SPSS software (version 25.0). Descriptive statistics, such as frequencies and percentages were used to summarize household characteristics, awareness levels and preventive practices. Chi-square tests were employed to examine associations between demographic factors and personal prophylactic measures. Environmental observations were analyzed qualitatively to identify common trends in mosquito breeding sites and water storage practices. The results were presented in tables to highlight key findings, ensuring a clear interpretation of data. Statistical significance was set at $p<0.05$ for all analyses.

Ethical Considerations: The study was conducted in accordance with ethical guidelines to ensure the rights and well-being of participants. Free and informed consent was secured from an adult representative of each household before data collection with the purpose of the study and the confidentiality of responses clearly explained. Participation was entirely voluntary and the respondents had the right to withdraw at any point without any consequences. Data were anonymized to maintain privacy and all information was securely stored to prevent unauthorized access.

Additionally, no invasive procedures or sensitive questions were included in the study to minimize discomfort to participants.

RESULTS

Awareness about dengue

Awareness level: About 82% of households were aware of dengue and its transmission through mosquito bites. However, only 63% could correctly identify symptoms such as fever, rash and joint pain and only 54% seek professional help. [Table 1]

Source of information: The primary sources of information were health workers (35%), media (40%) and community meeting (25%). [Table 2]

Personal prophylactic practices

Application of repellents: Personal repellents such as creams, sprays, ointment, gels, coils and liquid vaporizers were used by 72% households with daily use reported by 46%. In that, most households preferred coils and liquid vaporizers over creams and gels. [Table 3]

Use of mosquito nets: Around 31% of households reported using mosquito nets during sleep time and 59% installed nets for doors and windows. Protective clothing: Only 12% participants wore full sleeved clothing, full pants and socks regularly. [Table 4]

Biological and chemical control

Surprisingly about 43% of households reported using biological methods such as larvivorous fishes mainly Guppies (*Poecilia reticulata)* to control mosquito breeding. Approximately 48% households used insecticides sprays periodically. [Table 5]

Water supply, storage and sanitation process

About 88% households receive reliable water supply. In which 44% of households relied on open or bore wells, whereas 42% relied on Municipal water supply. About 90% households stored water in containers, but only 60% covered them adequately. About 62% of households maintained clean and tidy environment, while the rest maintained moderate to poor sanitation practices.

Mosquito breeding sites

Observations revealed potential breeding sites in 59% of households, mainly in open water containers, discarded tires, clogged drains, disposable items, plant pots and trays. [Table 6]

Community engagement

Participation in awareness campaigns and clean-up drives: About 25% of households participated in community led activities aimed at eliminating mosquito breeding sites.

Collaboration with Health Authorities: Only 15% of households reported to the Authorities regarding illegal dumping sites, building structure and damaged vehicle idling in neighborhood. Only 12% of households engaged with health workers for dengue prevention activities such as larvicide spraying or distribution of mosquito net. [Table 7]

Table 1: Awareness Level of Dengue

Parameter	Percentage (%)
Awareness about dengue and transmission	82%
Correctly identifying symptoms	63%
Seeking professional help	54%

Table 2: Source of Information about Dengue

Source of Information	Percentage (%)
Health workers	35%
Media	40%
Community meetings	25%

Table 3: Application of Personal Repellents

Parameter	Percentage (%)
Households using personal repellents	72%
Households with daily use of repellents	46%
Preference for coils and vaporizers over creams and gels	Majority

Table 4: Use of Mosquito Nets

Parameter	Percentage (%)
Households using mosquito nets during sleep	31%
Households with door/window nets installed	59%

Table 5: Methods of Mosquito Control

Method	Percentage (%)
Use of biological control (e.g., larvivorous fishes like Guppies)	43%
Periodic use of insecticide sprays	48%

Table 6: Water Supply and Sanitation Practices

Parameter	Percentage (%)
Households receiving reliable water supply	88%
- Relying on open or bore wells	44%
- Relying on municipal water supply	42%
Households storing water in containers	90%
- Adequately covering stored water	60%
Households maintaining a clean and tidy environment	62%
Households with moderate to poor sanitation practices	38%

Table 7: Participation in Awareness Campaigns and Dengue Prevention Activities

Activity	Percentage (%)
Households participating in community-led clean-up drives	25%
Households reporting illegal dumping sites and idle structures	15%
Households engaging with health workers for dengue prevention	12%

DISCUSSION

The findings of this study highlights gaps in preventive practices, vector control measures and community engagement of dengue. These results align with previous research and emphasize the importance of bridging gaps between awareness and practices. This study found that 59% of households had potential mosquito breeding sites, particularly in open water storage containers, discarded waste and clogged drains. Similar findings were reported by Gupta et al (2021),[8] who identified improper waste management and uncovered water storage as major contributors to mosquito breeding in India. Effective intervention such as regular cleaning and covering of water containers as recommended by WHO are essential to eliminate these breeding sites. The use of repellents (72%) was relatively high among participants, yet practices such as use of mosquito nets (31%) and wearing protective clothing (12%) were limited. This aligns with the findings of a study by Wong et al (2020),[9] which reported high awareness of preventive tools but inconsistent application due to discomfort and cost factors. Public health campaigns should emphasize the importance of adopting comprehensive personal protection measures, as highlighted in studies from dengue endemic regions like Malaysia and Thailand. While 90% households stored water, only 60% took adequate precautions to prevent mosquito breeding which is consistent with studies by Das et al (2019),[10] which showed that inadequate storage practices significantly increase the risk of mosquito proliferation. WHO guidelines recommend integrating community led sanitation programs to ensure regular cleaning and monitoring of water storage practices.[11]

Community participation in dengue prevention activities was low with only 25% households engaging in awareness campaigns and clean-up drive. Studies by Kumar et al (2018),[12] have shown that active community engagement significantly reduces dengue incidence by fostering collective responsibility and preventive action. Efforts should focus on increasing the frequency and visibility of awareness campaigns and leveraging local leaders and institutions to enhance community involvement.

Limitations

The study relied on self-reported data, which may be subjected to recall bias. Additionally, the observational nature of environmental assessments might have missed hidden breeding sites. Future research should incorporate longitudinal designs and larger samples for more robust conclusions.

CONCLUSION

This study on dengue prevention practices in three districts of North Kerala reveals significant gaps in preventive practices, vector control measures and community engagement of dengue. While there is high level of awareness about dengue, many households lack consistent preventive practices. The presence of mosquito breeding sites in 59% of households indicates a need for more effective environmental management and sanitation efforts.

Community participation in dengue prevention initiatives remains low, suggesting that more targeted outreach and mobilization are required to encourage active involvement. Improving water storage practices and promoting the use of personal protection methods such as mosquito nets and repellents, can play a crucial role in reducing mosquito exposure. Additionally, fostering community-driven clean-up campaigns and increasing the frequency of public health interventions can significantly improve dengue prevention in the region. Overall, the findings emphasize the importance of a multi-faceted approach, including enhanced public awareness, strengthened community involvement and better environmental management in controlling dengue transmission. These strategies combined with continued research and monitoring can help reduce the incidence of dengue and improve public health outcomes in North Kerala.

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Author Contributions

Ayisha Anchala Abdul Nazar and Nadva Nalakath conceptualized and designed the study, conducted it, collected the data, analyzed the data and prepared the manuscript. Luba E.K and Fadiya Ashraf reviewed the manuscript and provided feedback on study methodology.

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