KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DENGUE FEVER AMONG THE POPULATION IN RURAL COMMUNITY

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IN

PHARMACY PRACTICE

Submitted by

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CERTIFICATES

EVALUATION CERTIFICATE

This is to certify that the dissertation work entitled **"KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DENGUE FEVER AMONG THE POPULATION IN RURAL COMMUNITY",** submitted by the student bearing **Reg. No: 261640203** to "**The Tamil Nadu Dr.M.G.R.Medical University – Chennai**", in partial fulfilment for the award of Degree of **Master of Pharmacy** in **Pharmacy Practice** was evaluated by us during the examination held on.....

Internal Examiner **External Examiner**

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DECLARATON

I do hereby declared that the dissertation **"KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DENGUE FEVER AMONG THE POPULATION IN RURAL COMMUNITY"** submitted to "**The Tamil Nadu Dr.M.G.R Medical University - Chennai",** for the partial fulfilment of the degree of **Master of Pharmacy** in **Pharmacy Practice,** is a bonafide research work has been carried out by me during the academic year 2017-2018, under the guidance and supervision of **Mrs. K. Krishnaveni, M.Pharm, Ph.D.,** Assistant Professor, Department of Pharmacy Practice, J.K.K.Nattraja College of Pharmacy, Kumarapalayam.

I further declare that this work is original and this dissertation has not been submitted previously for the award of any other degree, diploma, associate ship and fellowship or any other similar title. The information furnished in this dissertation is genuine to the best of my knowledge.

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Dedicated to

Parents,

Teachers &

My Family

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CONTENTS

Introduction

1. INTRODUCTION

Dengue virus belongs to family *Flaviviridae*, having four serotypes that spread by the bite of infected Aedes mosquitoes. It causes a wide spectrum of illness from mild asymptomatic illness to severe fatal dengue haemorrhagic fever/dengue shock syndrome (DHF/DSS). Approximately 2.5 billion people live in dengue-risk regions with about 100 million new cases each year worldwide. The cumulative dengue diseases burden has attained an unprecedented proportion in recent times with sharp increase in the size of human population at risk. Dengue disease presents highly complex pathophysiological, economic and ecologic problems.[1] Dengue is known in India since 1940s, but the disease is very limited in its spread. Dengue is becoming rampant in many states of southern India. As of now, no specific treatments (therapies) or vaccines are available against the disease.[2]

Statistics from the National Vector Borne Disease Control Programme (NVBDCP) in 2017 show that the Kerala state recorded 4735 dengue cases with 7 death after Tamilnadu (3259 cases with 1 death) and was followed by Karnataka (759 case), Andhra Pradesh (512 case) and Gujarat (491 case) with no death case. In Tamilnadu, the number of cases increased from 2804 in 2014 to 4535 in 2015 but dropped to 2531 in 2016.[3]

Dengue virus causes a broad spectrum of illnesses, ranging from inapparent infection, flu-like mild undifferentiated fever, and classical dengue fever (DF) to the more severe form, DHF-DSS, from which rates of morbidity and mortality are high.[4]DF can occasionally develop into severe dengue that can cause serious illness and death. There is no specific treatment for dengue, but early detection and access to proper medical care lowers fatality rate below 1%.[5]

Dengue disease presents highly complex pathophysiological, economic, and ecologic problems.[6]One billion people (15% of the world's population) reside in India. India's population is twice that of Southeast Asia, the region that currently reports the most dengue-related deaths. A recent study done at the University of Oxford using a map-based approach to model how many dengue cases were occurring in various parts of the world, estimated that India had the largest number of dengue cases, with about 33 million apparent and another 100 million asymptomatic infections occurring annually.[7]

Dengue virus is a mosquito-borne *Flavivirus* and the most prevalent arbovirus in tropical and subtropical regions of the world.[8] Dengue virus is a positive-stranded encapsulated RNA virus. There are four distinct serotypes: Serotypes1-4.[9]Dengue started spreading in the interior of India with reported cases from western and southern India. Serotypes of the virus kept changing from year to year, and each time that either the serotype showed a change or the genotype showed a change, increased cases were seen in that area.[10]A shift in the age group involvement from children to young adults was also noticed in several studies from India.[11]Concurrent infection with multiple serotypes of dengue was also seen.[12]Thus, it is evident that now in India there is a definite increase in the frequency and number of outbreaks along with co-circulation of all four serotypes, hinting toward hyperendemicity of dengue in India.[13]

Dengue is one of the major public health problems which can be controlled with active participation of the community. Need is to organize health education programs about dengue disease to increase community knowledge and sensitize the community to participate in integrated vector control programs.[14,15]

People have inadequate knowledge about dengue and its preventive methods. They need more understanding of dengue fever. There is a need to make rural people aware of different preventive practices and reduce knowledge application gap. There is a need for information, education and communication programmes to combat problems related to this disease.[16]

The human habit of storing water in their homes leads to breeding of Aedes mosquitoes, vector of dengue. Furthermore, rainfall leads to artificial collection of water in discarded coconut shells, tires, and other materials. An important aspect of dengue control is awareness of dengue signs and symptoms, transmissions and preventive strategies among general population. Therefore the present study aimed to assess the knowledge, attitude and practice regarding dengue fever among the general population where the DF is highly epidemic.[17]

Despite extensive efforts in developing the effective dengue control measures, several factors pose difficulties in implementing efficient vector control measures, such as large population size, lack of awareness, lack of education, and poverty. Our study aimed to increase the disease

knowledge, attitude and practice among the general population. So that prevention of dengue will be intensified to control further disease transmission.

Dengue case definition

Earlier guidelines classified dengue into three categories: DF, an acute febrile illness; DHF (grades 1 and 2), a syndrome characterized by increased vascular permeability; and altered hemostasis that may progress to hypovolemic shock known as DSS (grades 3 and 4).[18] The new revised clinical classification of dengue cases now divides the clinical cases into two categories: dengue with or without warning signs, and severe dengue infection .[19]

Dengue virus

Dengue virus belongs to the genus *Flavivirus* in the family Flaviviridae. It is a positive-stranded encapsulated ribonucleic acid (RNA) virus that is composed of three structural protein genes that encode the nucleocapsid or core protein, a membrane-associated protein, an enveloped glycoprotein, and seven non-structural proteins. It is transmitted mainly by the *Aedes aegypti* mosquito and also by the *Aedes albopictus* mosquito. There are four antigenetically related but distinct serotypes of the dengue virus: DENV-1, DENV-2, DENV-3, and DENV-4. Each serotype has several subtypes or genotypes. DENV-1 has three, DENV-2 has two, and DENV-3 and DENV-4 each have four. In humans, one serotype produces lifelong immunity against reinfection but only temporary and partial immunity against the other serotypes. Each serotype has unique characteristics and can present with severe manifestations in a particular population depending upon its interaction with the host response.[20]

Diagnosis of dengue virus infection

Laboratory diagnosis of dengue is routinely done by demonstration of antidengue immunoglobulin M (IgM) antibodies or by non-structural protein 1(NS-1) antigen in patients' serum/plasma depending upon day of illness using either enzyme-linked immunosorbent assay (ELISA) or immune chromatographic-based rapid card tests. Rising titer of dengue immunoglobulin G (IgG) antibody can also be used for the diagnosis. Virus isolation techniques are very specific but rarely used due to increased complexity and the time taken to obtain results. The *Aedes albopictus (A. albopictus)* mosquito C6/36 cell line is the method of choice for virus

isolation, although other mosquito and mammalian cell lines (such as *Aedes pseudoscutellaris*, Vero and LLC-MK2 cells) can also be used. Molecular methods such as reverse transcriptase polymerase chain reaction (RT-PCR) or real time polymerase chain reaction (qRT-PCR) are being increasingly used in diagnosis. A single tube nested PCR with primers directed against serotype specific regions of the viral is routinely used for typing of the virus.[21]

Clinical: Acute febrile syndrome with headache, severe muscle pain and arthralgia, retro-orbital pain, often non-itchy skin rash. Sometimes positive tourniquet (Rumpel-Leede test) with DHF: petechiae appear after applying a sphygmomanometer to the upper arm. The sphygmomanometer is inflated to halfway between the systolic and diastolic blood pressure. The meter is left in place for 5 minutes. Afterwards one looks for petechiae in the crease of the elbow. If there are more than 20 in a 3-cm-diameter circle, the test is positive. This indicates significant capillary fragility, thrombocytopenia or disturbed blood platelet function.[22]

Laboratory: thrombocytopenia and leukopenia; raised haematocrit due to haemoconcentration. This haemoconcentration is the result of a "capillary-leak" syndrome, with effusions in the pleura and/or ascites accompanied by hypoalbuminaemia (fluid loss from the blood circulation).[22]

Serology: retrospectively, serological determination of antibodies is possible. There is considerable cross-reaction between the different dengue viruses. An important new development is the dengue ICT test. With this, both the IgM and IgG antibodies can be detected very quickly (in a few minutes). The test however is still quite expensive. Its reliability needs to be evaluated further, but ELISA is probably better, but more difficult in the field. Flaviviruses share antigenic epitopes, which elicit cross-reacting antibodies. These cross-reactive responses can confound the interpretation of serological tests, and it is often impossible to determine with certainty the infecting virus without resorting to performing neutralization tests.[22]

Antigen and genome detection. A dengue antigen detection assay will be positive during the early viraemic phase. Demonstration of viral antigen in autopsy tissue, serum or cerebrospinal fluid by immunohistochemistry, immunofluorescence or ELISA. PCR is used for detection of dengue genomic sequences in serum or CSF.[22]

Pathogenesis of dengue

Replication of the dengue virus occurs within mononuclear cells including skin dendritic cells, tissue macrophages, peripheral blood monocytes, and hepatocytes. At present, the host cell receptors involved in the viral entry are mostly unknown.[23] Primary or first infection in nonimmune persons usually causes DF. Subsequent dengue infection by a different serotype causes more severe illness, such as DHF/ DSS. The key manifestations of DHF/DSS are sudden onset of shock, capillary leakage, and hemorrhagic diathesis/ thrombocytopenia occurring at the time of defervescence of fever. Pathogenesis is not well-defined, but it is suggested that during secondary infection with a different serotype, cross-reactive nonneutralizing antibodies bind to DENV and facilitate uptake via Fc receptors, resulting in enhanced viral replication. The resultant higher viral antigen load leads to an exaggerated activation of cross-reactive dengue specific T cells. Biological mediators released by the activated T cells as well as virus-infected cells along with complement activation by viral proteins and immune complexes are implicated in increasing vascular permeability and coagulopathy.[24] This phenomenon is known as antibody-dependent enhancement.

Treatment of dengue virus infection

Currently, no effective antiviral agents to treat dengue infection are available. The management of dengue virus infection is essentially supportive and symptomatic. Intravenous rehydration is the therapy of choice; this intervention can reduce the case fatality rate to less than 1% of severe cases. The dynamic nature of dengue demands close monitoring and repeated clinical and laboratory evaluations. A rapid response to platelet and fresh frozen plasma and cryoprecipitate transfusion is seen.[25]

Most cases can be treated on an out-patient basis. Symptomatic treatment should avoid aspirin and NSAIDs (risk of bleeding), but paracetamol can be used. Steroids are not effective. The patient or the parents of the sick child should be informed of the potential risk of complications, and in-patient care is required if early signs of complications appear.
In the case of haemorrhagic dengue, IV fluids such as Ringer's lactate will be used for fluid balance (check weight and urine production). The idea is to rapidly restore circulating blood

volume with crystalloids, but these crystalloid fluids are freely distributed across extracellular space. Colloids generate oncotic pressure since they are contained in the intravascular space, but are more expensive and some can produce hypersensitivity reactions. If there is an insufficient improvement of shock after Ringer's lactate, use colloids. Since albumin is prohibitively expensive, use starch (hydroxy ethyl starch 6%), gelatin, dextran 40 or 70. Giving blood transfusion (fresh whole blood or fresh frozen plasma, e.g. with severe gastrointestinal bleeding) or platelets transfusion depends upon clinical need (of course), local circumstances and infrastructure.

Use of the above mentioned antiplatelet drugs is contraindicated during dengue, and any other condition which can result in important thrombocytopenia, such as malaria.[22]

Prevention of dengue

Vector control

With limited therapeutic strategies and the current lack of a vaccine, effective vector control methods are an essential component to reduce dengue-related mortality and morbidity. *A. aegypti* is the most common vector of dengue in India, followed by *A. albopictus*. Water-holding containers, eg, plastic, metal drums, and cement tanks facilitate breeding of *Ae. aegypti*. Vector control methods involve environmental, chemical, and biological management approaches. Utilizing an effective integrated vector control strategy with a combination of approaches, such as social mobilization and integration of chemical and nonchemical vector control methods targeting areas of high human–vector contact, will aid in reducing dengue transmission. The evolution and spread of resistance to insecticides is a growing concern for the control of dengue vectors. Bioassay data demonstrate that resistance to organophosphates (temephos) and pyrethroids is widespread in *A. aegypti*, and resistance has also been reported in *A. albopictus*.[26]Monitoring resistance is, therefore, necessary to ensure that effective insecticides are being used. The National Vector Borne Disease Control Program has been initiated to control the emerging threat by vector-borne diseases in India. Despite extensive efforts in developing the effective dengue control measures, several factors pose difficulties in implementing efficient

vector control measures, such as large population size, lack of awareness, lack of education, and poverty.[26]

There is at present no commercial vaccine available. Experimental tetravalent vaccines are investigated. In view of the possibility of "enhancing antibodies" in natural infections, clinical vaccine studies are not going to be easy since volunteers will have to be followed for much longer periods than is usual in Phase III trials. The fear is that monovalent vaccines might make future infections with a different serotype worse. A tetravalent vaccine would need to induce roughly equal and lasting protection against all four dengue serotypes. The development of a vaccine is made more difficult by the lack of an animal model. Monkeys infected with dengue produce antibodies, but don't get ill. Early development on a live, attenuated vaccine showed good response to dengue type 1, 2 and 4, but had major problems with serotype 3. To date, these problems have not been solved yet. Alternatives to live attenuated vaccines are considered. One of the candidate vaccine is a chimeric yellow fever vaccine/dengue virus. It is not yet known if such recombinant vaccines will efficacious. Contact with *Aedes* mosquitoes can be reduced with insect repellents. Sleeping at night under a bednet does not give any protection against *Aedes* that bite during the day but can be useful for e. g. children sleeping during the day. In epidemics the vector has to be controlled by using, for example, insecticides (*Bacillus thuringiensis* H-14; temephos = Abate®). If only the adult mosquitoes are to be controlled, for example with so-called "adulticides", very rapid reduction in the number of adult mosquitoes can be achieved. This reduction will however only be for a short time. The insecticides soon lose their effect, after which mosquitoes that have hatched occupy the ecological niche that has been vacated. After all, mosquitoes display a strong r-selection (for r- and K-type selection, see Chagas' disease). It is therefore strongly advised that the breeding sites are controlled as well, as using larvicides. Slow-release formulations of methoprene (Altocid®) can be used here for this purpose. If *Aedes albopictus* plays an important role, appropriate measures are necessary for this (for example by expandable polystyrene beads that float on the water of septic tanks).

It is important that there are as few breeding sites as possible for the vector. *Aedes aegypti* is a peridomestic mosquito and this means that the population can be controlled. The elimination of

small water reservoirs (breeding sites) near housing (cans, car tyres, vases, bottles, buckets, snail shells, coconut shells, bamboo stubble, hollows in plants, waste gullies, etc.) by clearing away rubbish and by having a "dry" day systematically once a week is important in controlling *Aedes aegypti*. On "dry days", all small water containers (buckets, vases) are emptied so as to interrupt the cycle of the mosquitoes. The larvae and pupae of the insects are destroyed before adult mosquitoes can emerge. Large reservoirs - drinking water for example - cannot of course be emptied quite so simply. Because large water containers have such a great epidemiological importance in some areas (Thailand for example), covering these with a fine-mesh net is effective in considerably reducing the population of *Aedes* mosquitoes (much better than a normal cover). Temephos pellets (Abate®, a larvicide) can be placed in water containers and is non-toxic for humans.

An experimental technique that is being tested in India, as well as elsewhere, is to create artificial preferred breeding sites in gardens or near workplaces using old car tyres. A bait and an insecticide (such as an insect growth regulator, which disturbs the synthesis of chitin) are put in the tyres. For larger water collections, larvivorous fish are sometimes used (*Poecilia*, *Aplocheiluspanchax*, *Macropodus*), but *A. aegypti* has a preference for laying its eggs in small hollows. *Gambusiaaffinis* has also been tested but was not very effective. Sometimes small copepods of the genus *Mesocyclops* are put in water containers. This is simple, cheap and sometimes effective. *Mesocyclops* cannot be used in areas where Guinea worm is endemic because it is an intermediary host. Pyriproxyfen is a juvenile hormone analogue which is not toxic for adult insects, but which can be spread via them to breeding sites.

Methoprene and juvenile hormone

The use of methoprene needs some explanation. For metamorphosis (a process of considerable histolysis and neohistogenesis), the corpora allata, two small structures behind the insect's brain, secrete an acyclic sesquiterpene, the so-called juvenile hormone. Depending on the concentration of this hormone, the metamorphosis ensures growth of the larva, development to pupa or adult insect. Methoprene is structurally similar to juvenile hormone and is a growth-regulating

substance that prevents development into an adult. After exposure to methoprene, the larvae are not able to develop further than the pupa stage.

Animals with a chitinous exoskeleton can only increase in size by discarding their old cuticle and by making a new and larger one. The process of shedding is started when the brain of the insect secretes an active hormone ("prothoracicotropic hormone"). This affects the prothoracic gland of the insect. This gland then secretes ecdysone, a steroid hormone (Gr. "ekdysis": to shed, to peel). By enzymatic apolysis the cuticle can separate from the underlying tissue. A new cuticle forms beneath the old one which is shed and the new cuticle can harden. This process can be disturbed via several chemicals.

Examples of prevention programmes

There was a major dengue epidemic in Cuba in the '80s. There was a very successful national control programme to combat the vector. The participation of the population was extremely important. In 1997 Brazil launched a national *Aedes aegypti* eradication programme. Tens of thousands of people were trained to visit every house in their area once every three months and give advice on clearing the breeding sites. Information was given on a large scale to the public. In some places and in some circumstances insecticides were sprayed. The programme did however suffer from considerable problems in terms of bureaucracy.

Experimental

If it were possible to make the natural vector resistant to viral infection or remove its ability to transmit, this would open up tremendous prospects for the future. Genetic engineering of vectors is still at a very early stage. In 1996 success was achieved in expressing antisense RNA against the dengue viral genome in *Aedes aegypti*. The presence of this antisense RNA prevented dengue virus infection of the salivary glands of the insect. As a result, the mosquito could no longer transmit the virus. In view of the current controversy about "genetic engineering", such a new experimental approach to the dengue problem can be expected to draw its share of criticism.

Why can the sterile insect technique used for example against New World screw worm not be used? Because irradiated mosquitoes are unable to complete with wild-type males to mate with

females (irradiation reduces male fitness). One of the transgenic *Aedes aegypti* mosquitoes being studied, has a genetic modification that kills any offspring in the larval stage if they are not fed tetracycline. In the lab, they get this antibiotic and can be grown by the millions. The male mosquitoes, once in the wild, are designed to die out rather than spread (after mating with a wild-type female).

Wolbachia are maternally inherited intracellular bacterial symbionts that are estimated to infect more than 60% of all insect species, but tend to be absent from mosquito species which transmit major human pathogens. These bacteria are passed through the eggs of infected females, so only the descendants of infected mosquitoes carry them. Infection with Wolbachia induces cytoplasmatic incompatibility, so that infected insects have a reproductive advantage. Matings of infected females with non-infected males are fertile, while matings of uninfected females with infected males do not produce eggs. Most pathogens require a relatively long period of development in their mosquito vector before they can be transmitted to a new human host, hence the epidemiological importance of older insects. Infection of *Aedes aegypti* with *Wolbachia* changes the adult life span of the mosquitoes. Infection seems to inhibit dengue viral replication and dissemination in *Aedes aegypti,* probably by priming the mosquito innate immune system, thereby hindering human pathogens from developing. Further study of this and related subjects might lead to new ways of controlling dengue transmission.

Many variants of genetic modified mosquitoes are studied. In 2009 during a six-month trial on Grand Cayman Island, more than 3 million mutant male *Aedes aegypti* were released into the wild. A mutation in a gene called *tTA (tetracycline-controlled transactivator)* caused the larvae and pupae of offspring to die prematurely. At the end of the trial the population of dengue-carrying *A. aegypti* females fell from 60 to 10%. These results were released in November 2010. Trials (Oxitec Company) in other locations (e.g. Malaysia, Mexico, Bahia in Brasil) have been conducted or are under way. One idea worth mentioning is the introducing of a gene which results in females having underdeveloped flight muscles. Male mosquitoes are unaffected, and will mate with wild females, spreading the mutant gene. Male mosquitoes don't bite and do not infect people. The transgenic females cannot fly and cannot transmit dengue.[22]

Symptoms of Dengue Fever

DF, also known as breakbone fever, is a mosquito-borne infection that can lead to a severe flu-like illness. It is caused by four different viruses and spread by *Aedes* mosquitoes.

Symptoms range from mild to severe. Severe symptoms include dengue shock syndrome (DSS) and dengue hemorrhagic fever (DHF). These usually require hospitalization.

Doctors often have trouble diagnosing dengue because its symptoms can vary widely. Some patients show no symptoms at all. Babies and young children infected with the dengue virus typically have mild symptoms such as a fever and a rash over their entire bodies, but no other symptoms of dengue. Older children and adults may also have these mild symptoms, or they may have classic symptoms of dengue, including a high fever that lasts for two to seven days, severe pain in the muscles, bones, and joints, pain behind the eyes, fatigue, severe headaches, Mild bleeding (such a nose bleed, bleeding gums, or easy bruising) nausea and vomiting, and a rash. Dengue fever is characterized by a fever response with two peaks. Near the beginning of the infection, the patient experiences a very high body temperature, which then starts to drop and suddenly climbs again for a second time. Other symptoms of dengue fever include a decrease in the number of white blood cells and a low level of platelets in the blood. Patients with dengue fever may have skin hemorrhages (bleeding under the surface of the skin) that appear as red or purple spots on the body. Recovery from dengue fever is often lengthy, lasting several weeks, and patients can experience lingering fatigue and depression.[27]

Sometimes, symptoms are mild and can be mistaken for those of the flu or another viral infection. Younger children and people who have never had the infection before tend to have milder cases than older children and adults. However, serious problems can develop. These include dengue hemorrhagic fever, a rare complication characterized by high fever, damage to lymph and blood vessels, bleeding from the nose and gums,dyspnea, lethargy, diffusion, clammy skin, sensitive stomach, internal bleeding, which can lead to black vomit and feces, or stools, weak pulse, enlargement of the liver (painful hepatomegaly), and failure of the circulatory system. Thrombocytopenia is severe and there are signs of plasma leakage, leading to hemoconcentration (>20% above average: a drop of >20% of packed cell volume after volume

replacement treatment), hypoproteinemia and pleural effusions, ascites and/or pericardial effusion (due to capillary leak syndrome). Overt dengue hemorrhagic fever (positive tourniquet test with petechiae, ecchymoses, purpura, bleeding from mucosa (epistaxis, melena), prolonged bleeding from injection sites) and dengue shock syndrome may be dramatic and mortality is high (50% without treatment). Dengue shock syndrome includes the criteria for dengue hemorrhagic fever plus signs of circulatory collaps with rapid and weak pulse, narrow pulse pressure (< 20 mm Hg), hypotension with cold, clammy skin, cold extremities, decreased diuresis, dyspnea and restlessness or lethargy. The cerebrospinal fluid is usually normal, but occasional raised pressure and lymphocytosis (5-500 x 10^6 cells/l) in the CSF can be observed. The DHF symptoms may progress to massive bleeding, shock, and death. This is called dengue shock syndrome (DSS). It include intense stomach pain, disorientation, heavy bleeding, regular vomiting, blood vessel leaking fluid and sudden hypotension, or a fast drop in blood pressure.[22,27]

People with weakened immune systems as well as those with a second or subsequent dengue infection are believed to be at greater risk for developing dengue hemorrhagic fever.[27]

This occurs mainly in children. The cause of this serious course is not an infection with a more virulent virus. Dengue infection leads to the development of circulating antibodies. These mainly protect against the serotype involved ("neutralising" antibodies). However, when there is a subsequent infection with a different serotype, these antibodies sometimes enhance virus multiplication during the second infection and increase the severity of disease. The patient is at far greater risk of dengue hemorrgaic fever during a second infection with a different serotype. This creates great difficulties in the design of a vaccine, which has to be tetravalent. After infection there is probably life-long immunity against the dengue serotype which caused the infection. In the past, the four serotypes used to be isolated geographically, making second infections exceptional. In this modern era of increased international travel, the four dengue viruses often circulate in a given region, although still one of them tends to dominate. Furthermore the virus has changed genetically over the last three decades, becoming more pathogenic.[27]

In DHF, one can expect:

- fever (the first 1-4 days)
- haemorrhagic complications or positive tourniquet test
- thrombocytopenia< 100,000/µl
- signs of plasma loss such as pleural fluid, ascites, hypoproteinaemia, an increase in the haematocrit to > 20% above normal or a drop in the haematocrit of > 20% after hydration. This often starts when fever disappears around the third or fourth day, with subsequent vomiting and abdominal pain.[22]

The severity of the condition (DHF/DSS) can be given by a clinical score:

1. Grade 1: thrombocytopenia (<100,000/µl) with a raised haematocrit (>20% of the starting value)
2. Grade 2: idem as 1 + spontaneous haemorrhages or positive tourniquet test
3. Grade 3: idem as 1 or 2 + hypotension
4. Grade 4: idem as 3 but the blood pressure is not measurable.[22]

Severe Dengue

Infection with the dengue virus can also cause a disease called severe dengue, which is more serious than DF. Although the early symptoms of severe dengue are similar to dengue fever, severe dengue has a much higher death rate. As with DF, patients with severe dengue have a high fever, experience bleeding, and have a reduced white blood cell count.

The major symptom of severe dengue is leakage of blood plasma out of the capillaries. This leakage occurs 24 to 48 hours after the patient's fever drops, a period doctors refer to as the critical phase. Patients who improve after their fever drops are said to have dengue, but patients who deteriorate have severe dengue. In people with severe dengue, the escape of the plasma from the circulatory system can cause fluids to collect in body cavities. Scientists can detect plasma leakage by observing a higher-than-normal concentration of red blood cells and an abnormally low protein level in the blood. Another sign of severe dengue is severe bleeding. In some cases, stomach and intestinal bleeding can cause death. In addition, patients with severe

dengue have a tendency to bruise easily and experience changes in blood pressure and pulse rate. Most patients recover from severe dengue with intravenous fluid replacement.

The loss of plasma and protein can cause the patient to experience a condition called shock. Patients in shock show signs of circulatory failure. The lack of blood circulation causes the patient to have cold, clammy, bluish skin. Patients experiencing shock seem restless, and their blood pressure and pulse may be undetectable. Severe dengue can also lead to respiratory distress and injury of other organs. If untreated, shock can lead to death within 24 hours, but if treated quickly with intravenous fluid replacement, patients can recover.[28]

Prevention and control

At present, the main method to control or prevent the transmission of dengue virus is to combat vector mosquitoes through:

- preventing mosquitoes from accessing egg-laying habitats by environmental management and modification;
- disposing of solid waste properly and removing artificial man-made habitats;
- covering, emptying and cleaning of domestic water storage containers on a weekly basis;
- applying appropriate insecticides to water storage outdoor containers;
- using of personal household protection such as window screens, long-sleeved clothes, insecticide treated materials, coils and vaporizers;
- improving community participation and mobilization for sustained vector control;
- applying insecticides as space spraying during outbreaks as one of the emergency vector-control measures;
- active monitoring and surveillance of vectors should be carried out to determine effectiveness of control interventions.

Careful clinical detection and management of dengue patients can significantly reduce mortality rates from severe dengue.[28]

Mechanism of dengue

Hemorrhagic Variant: The hemorrhagic dengue variant seems to be able to replicate in the human body only in macrophages. It is possible that the virus-antibody interactions actually help hemorrhagic viral replication by promoting cell infection. This is via specific macrophage receptors the Fc portion of the antibody molecule, or possibly via a protease-sensitive receptor.

Apparently, the antibodies attach to the virus's outer envelope, then signal the larger macrophages. When a macrophage responds to the antibody signal and arrives on the viral scene, it engulfs the virus. However, the virus then takes control of the macrophage and replicates inside the macrophage instead of being destroyed by it. The virus is then carried throughout the body via the macrophage transports.

Physical reactions triggered by this involvement of the immune system include fevers from 104-107 F, convulsions, shock, and death.[29]

Dengue also known as

Breakbone fever, named by Dr. Benjamin Rush in Philadelphia, 1780; a reference to the symptom of aching joints.

Dandy fever

Seven-day fever

Duengero - from the Spanish *duengo*

Ki dengapepo - Swahili: "it is a sudden overtaking by a spirit."[29]

Classification

Dengue is a single disease with several different clinical presentations. It was previously classified into DF, DHF and DSS. However, there is overlap between these manifestations, as dengue fever is a spectrum of disease. In 2009 the World Health Organization (WHO) revised the classification according to levels of severity.

NB: apart from text dealing with dengue fever historically, to encompass the disease's different clinical presentations, this article will refer to 'dengue'.

The WHO classification encompasses two clinical entities, one of which is further divided:

- **Non-severe dengue** - fever followed by recovery characterises non-severe dengue. It is subdivided into:
    - **Dengue without warning signs** - fever with two of the following: nausea/vomiting, rash, aches and pains, positive tourniquet test, leukopenia.
    - **Dengue with warning signs** - the above plus any of: abdominal pain, persistent vomiting, fluid accumulation, mucosal bleeding, lethargy, liver enlargement, increasing haematocrit with decreasing platelets. Those who deteriorate to develop severe dengue tend to have warning signs. They are likely to recover with intravenous rehydration.
- **Severe dengue** - this is dengue with severe plasma leakage, severe bleeding, or organ failure. There may be shock, respiratory distress or organ damage. Further deterioration of dengue with warning signs is classified as severe dengue. A second subsequent infection with a different serotype of the dengue virus increases the risk of developing severe dengue.[30]

Pathophysiology[31]

Infection by any of the four serotypes may range from asymptomatic to life-threatening. The pathological effects are immune-mediated.[32]The development of severe disease seems to involve a complex interplay of host immunity and genetic predisposition combined with certain viral virulence factors.[32]

- Patients become infected once bitten by infected mosquitoes.
- The virus passes to lymph nodes and replicates, mainly in monocytes and macrophages. It then spreads to the circulation and other tissues.
- Incubation period is 2-7 days.
- Initial immune activation leads to a flu-like illness of varying severity (dengue and severe dengue can be very similar at the start of the illness).
- There is a tendency to haemorrhage associated with severe thrombocytopenia: this can also be seen in non-severe dengue.

- Proliferation of T cells and the production of cytokines may lead to vascular endothelial cell dysfunction and to plasma leakage. When severe this capillary leak characterises severe dengue. It causes an increase in haematocrit, hypoalbuminaemia, pleural effusions and ascites.
- In severe cases there may be multiple organ failure.
- Multiple organ dysfunction can also result from direct viral damage to organs, particularly heart, brain and liver.
- Recovery from infection by one dengue serotype provides full lifelong immunity only against that serotype. Cross-immunity to the other serotypes is partial and temporary.
- Subsequent infections by other serotypes increase the risk of developing severe dengue.
- Infants can develop severe dengue infection during their primary infection due to transplacental transfer of maternal antibodies to a different serotype from an immune mother. These amplify the infant's immune response to the primary infection.
- The pathogenesis of severe dengue is thought to be immune-mediated. Recent evidence suggests cross-reactive high pro-inflammatory cytokine producing T cells predominate in severe dengue. Studies also suggests that there may be a genetic susceptibility to severe disease.[32]

Prognosis[33]

- Dengue is typically a self-limiting flu-like disease.
- The vast majority have no serious sequelae and the return of appetite is a good marker of recovery. However, recovery can be associated with prolonged fatigue and depression.
- The overall mortality rate is less than 1%.
- Severe dengue has a mortality rate of 50% if untreated; however, this is reduced to less than 5% if appropriately treated.
- Most severe dengue and most deaths occur children aged under 15 years; however, in recent years the numbers of deaths in young adults has increased, particularly in Asia.

Complications[33]

- Heart failure

- Encephalopathy
- Myocarditis
- Disseminated intravascular coagulation
- Septicaemia

Chapter – 2

Literature Review

2. LITERATURE REVIEW

Alyousefi *et al*., 2016[34] conducted a household-based, cross-sectional survey in three urban districts encompassing 383 households. Data on the socio-demographic characteristics and KAPs of the participating household heads were collected using a pre-designed, structured questionnaire. More than 90.0 % of respondent household heads had correct knowledge about fever, headache and joint pain as common signs and symptoms of dengue fever. Moreover, muscular pain and bleeding were perceived bymore than 80.0 % of the respondents as being associated with dengue fever; however, only 65.0 % of therespondents reported skin rash as a sign of dengue fever. More than 95.0 % of respondents agreed about the seriousness and possible transmission of dengue fever; however, negative attitudes regarding the facts of being at risk of the disease and that the infection is preventable were expressed by 15.0 % of respondents. Despite the good level of knowledge and attitudes of the respondent population, poor preventive practices were common. Bivariate analysis identified poor knowledge of dengue signs and symptoms (OR = 2.1, 95 % CI = 1.24–3.68; P = 0.005) and its vector (OR = 2.1, 95 % CI = 1.14–3.84; P = 0.016) as factors significantly associated with poor preventive practices. However, multivariable analysis showed that poor knowledge of the vector is an independent predictor of poor preventive practices of the population (adjusted OR = 2.1, 95 % CI = 1.14–3.84; P = 0.018). The majority of people in urban communities of Taiz have a clear understanding of most signs/ symptoms of dengue fever as well as positive attitudes towards the seriousness and possible transmissibility of dengue fever. However, negative attitudes regarding their perception of the risk and possible prevention of the infection are prevailing among a small proportion of the population and need to be targeted by educational campaigns. It appears that the good level of the population knowledge of the signs/symptoms of dengue feverand the factors contributing to the spread and control of its vectors did not translate into good practices.

Alhazmi *et al*., 2016[35] evaluated the baseline level of knowledge, attitude, and practice (KAP) about DF and their predictors among high school students in Makkah City, Saudi Arabia. A cross-sectional study was designed and was conducted at Makkah high schools during the educational year 2014/2015. A multistage stratified random sample method with a proportional

allocation technique was used in the study. The stratifications took into consideration the gender, school type, geographic educational district, specialty of the student, and educational year. Ten schools were randomly selected in Makkah to evaluate KAPs of students about DF. A total of 362 questionnaires were completed. This study showed that knowledge about DF was deficient; 59%, 32.7%, and 8.3% of the students obtained poor, fair, and satisfactory knowledge scores, respectively. Having heard about DF was the strongest predictor for having high knowledge score (t test = 4.47, $p < 0.001$). This was followed by female gender (t test = 5.81, $p < 0.001$) and positive family history of DF (t test = 3.18, $p < 0.01$). The only factor that significantly affected the self-reported practices scores was their level of knowledge about the disease (t test = 3.16, $p < 0.01$). KAP toward DF was deficient among target populations. School-based educational campaigns and social mobilizations are needed to raise the awareness and to translate knowledge into sound practice within all schools in Makkah City.

Siddiqui *et al*., 2016[36] conducted community-based cross-sectional study. In thisstudy, 6 randomly selected towns were visited, 2 persons (man and woman) per household were interviewed using a structured questionnaire, and household practices were observed. Information regarding DF was shared through a printed pamphlet. Multivariate logistic regression analysis of variables associated with dengue knowledge and practices were conducted. We interviewed 608 Karachi residents (mean age: 33.2 ± 13.35 years); 7.7%, 71.9%, and 20.4% had a high, middle, and low socioeconomic status, respectively. The mean knowledge score was 6.4 ± 2.10 out of 14. The mean preventive practices score was 9 ± 1.8 out of 17. Predictors of dengue knowledge were perceived threat (odds ratio [OR] = 1.802; 95% confidence interval [CI] = 1.19±2.71; p = 0.005), self-efficacy (OR = 2.910; 95% CI = 1.77±4.76; p = 0.000), and television as an information source (OR = 3.202; 95% CI = 1.97±5.17; p = 0.000). Predictors of dengue preventive practices were perceived threat (OR = 1.502; 95% CI = 1.02±2.19; p = 0.036), self-efficacy (OR = 1.982; 95% CI = 1.34± 2.91; p = 0.000), and dengue knowledge (OR = 1.581; 95% CI = 1.05±2.37; p = 0.028). Public knowledge about DF is low in Karachi. Knowledge, threat perception, and self-efficacy are significant predictors of adequate dengue preventive practices. Prevention and control strategies should focus on raising awareness about

dengue contraction risk and severity through television. Health messages should be designed to increase individual self-efficacy.

Mohapatra *et al*.,2016[37] conducted a hospital based cross-sectional survey among general OPD patients using a pre-designed questionnaire. KAP assessment was done by a scoring system. KAP of DF among study population was represented as proportions (%). Out of 223 individuals interviewed, 93% identified fever as a cardinal symptom of DF. The knowledge about other symptoms of DF was low among participants. Only 17.5% knew that DF is transmitted by Aedes mosquitoes. The correct timing of biting time was known by only 14%. Despite low knowledge, the participants had good attitude and most of them reported good preventive practices against dengue prevention and control. The knowledge of participants of our study was low and the attitude and practice was good in lieu of protection from other mosquito borne diseases. Therefore massive awareness campaigns are urgently required to protect the health of people against DF and to limit in future spread of DF in this part of our country.

Handel *et al*., 2016[38] conducted a 37-item questionnaire of dengue knowledge, attitudes, and practices administered to dengue healthcare providers in Machala, Ecuador. Survey focus areas includeddemographics, infection and prevention of dengue, dengue diagnosis and the WHO dengue guide, laboratory testing, treatment of dengue and opinions regarding dengue. A total of 76 healthcare providers participated in this study, of which 82 % were medical doctors and 14 % were nurses. Fifty-eight percent of healthcare professionals practiced in ambulatory clinics and 34 % worked in a hospital. Eighty-nine percent of respondents were familiar with the 2009 WHO Dengue Guidelines, and, within that group, 97 % reported that the WHO Dengue Guide was helpful in dengue diagnosis and clinical management. Knowledge gaps identified included Aedes aegypti mosquito feeding habits and dengue epidemiology. Individuals with greater dengue-related knowledge were more likely to consider dengue a major health problem. Only 22 % of respondents correctly reported that patients with comorbidities and dengue without warning signs require hospital admission, and 25 % of providers reported never admitting patients with dengue to the hospital. Twenty percent of providers reported rarely (≤25 % of cases) obtaining laboratory confirmation of dengue infection. Providers reported patient presumptive self-

medication as an on-going problem. Thirty-one percent of healthcare providers reportedinadequate access to resources needed to diagnose and treat dengue. Participants demonstrated a high level of knowledge of dengue symptoms and treatment, but additional training regarding prevention, diagnosis, and admission criteria is needed. Interventions should not only focus onincreasing knowledge, but also encourage review of the WHO Dengue Guidelines, avoidance of presumptive self-medication, and recognition of dengue as a major health problem. This study provided an assessment tool that effectively captured healthcare providers' knowledge and identified critical gaps in practice.

Aim and Objectives

3. AIM & OBJECTIVE

Aim:

- The present study aimed to assess the knowledge, attitude and practice towards dengue fever among the population in rural community.

Objective:

- To find out the socio demographic status of our study population
- To assess the health status of the individual related to dengue fever
- To assess the knowledge of symptoms, sign, and transmission mode of dengue infection
- To assess the attitude towards dengue fever
- To assess the preventive measures against dengue infection

Plan of Work

4. PLAN OF THE WORK

Phase I

- Obtain approval from institutional ethical committee (IEC).
- Literature review.
- Design suitable questionnaire form.

Phase II

- Collect patient demography.
- To assess the knowledge related to dengue infection.
- To assess the level of attitude, and practice related to dengue.

Phase III

- Data analysis.
- Report submission.

Methodology

5. METHODOLOGY

Study site and design:

A cross sectional study is going to be conduct from July2017 to February 2018 in rural communities in katheri village, Salem district, Tamilnadu, India.

Study design

Cross sectional study

Study period

This study was conducted over a period of 8 months from July 2017 to February 2018.

Sample size

Total sample size n=500

By using the formulasample size $n = N*X / (X + N - 1)$,(if assuming N=5000 population size)

n=5000*502/5000+502-1

sample size n=456

Where $X = Z_{\alpha/2}^2 * p*(1-p) / MOE^2$,and $Z_{\alpha/2}$ is the critical value of the Normal distribution at α/2 (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. Note that a Finite Population Correction has been applied to the sample size formula. MOE= 4.37% (if assuming 500 sample size then the MOE is 4.37%).

$X= 1.96^2*.50*(1-.50)/ 0.0437^2$

X= 502

Sample size estimations were based on expected sample size is 500 and then the margin of error will be 4.37%. Expected population size of 10,000 and assumed sample proportion is 50%.It

was also taken into consideration that 5% of all the filled up forms will be incomplete and rejected. Thus the total sample size taken was 500.

Inclusion criteria

The participants were residents ofKatheri, who were living there for atleast one year.

The age group for study population is 25 –70 years

Healthy individual members of household are the study population

Exclusion criteria

Participants having reported fever

People who had migrated from nearby villages and other districts within past one year are excluded from the study.

Study instrument

A modified, pre tested questionnaire was developed and it was tried on some samples in rural community to check for feasibility and reliability. Necessary revisions were made based on the feedbacks to make the questions more clear and understandable. This questionnaire was examined for a second time and changes were made to suit our circumstances.

The purpose of the questionnaire was to assess the knowledge, attitude, and practice (KAP) of the participants toward dengue fever.

The Questionnaire consisted of three parts:

- **Part 1**: Demographic and socio-economic data: the Demographic information related to age, gender, education and occupation were collected in this section.
- **Part 2**: Exposure to dengue fever: This component consisted of any preventive measures taken by government and any experience of dengue infection.
- **Part 3**: KAP related to cervical cancer: There were questions aimed to assess the knowledge, attitude and practices related to dengue fever.

The knowledge about cervical cancer was detected by using 3 components. They are risk factors, signs and symptoms and prevention of cervical cancer.The attitude and practice towards cervical cancer screening and vaccination questionnaire was included.

Informed consent and ethical clearance

Study protocol was approved by Institutional Ethical Committee. The nature and purpose of the study was explained and their consent sought. Study subjects were interviewed with semi structured questionnaire. They were provided information about the study, its objectives and assurance of confidentiality and those who met the inclusion criteria were invited to participate in the study. Those who voluntarily agreed to participate signed a free informed consent and were interviewed.

Statistical analysis

The collected data were entered in an Excel chart sheet and analysis was done by using number and percentage for nominal data (such as gender, marital status, profession).

Results

6. RESULTS

Table 1: Gender wise distribution of the population

S.No	Gender	Total number of participants(n=500)	Percentage
1	Male	196	39.2%
2	Female	304	60.8%

Figure 1: Gender wise distribution of the population

Table 2: Age wise distribution of the population

S.No	Age group	Total number of participants (n=500)
1	21-30 years	95(19%)
2	31-40 years	123(24.6%)
3	41-50 years	101(20.2%)
4	51-60 years	135(27%)
5	>60 years	46(9.2%)

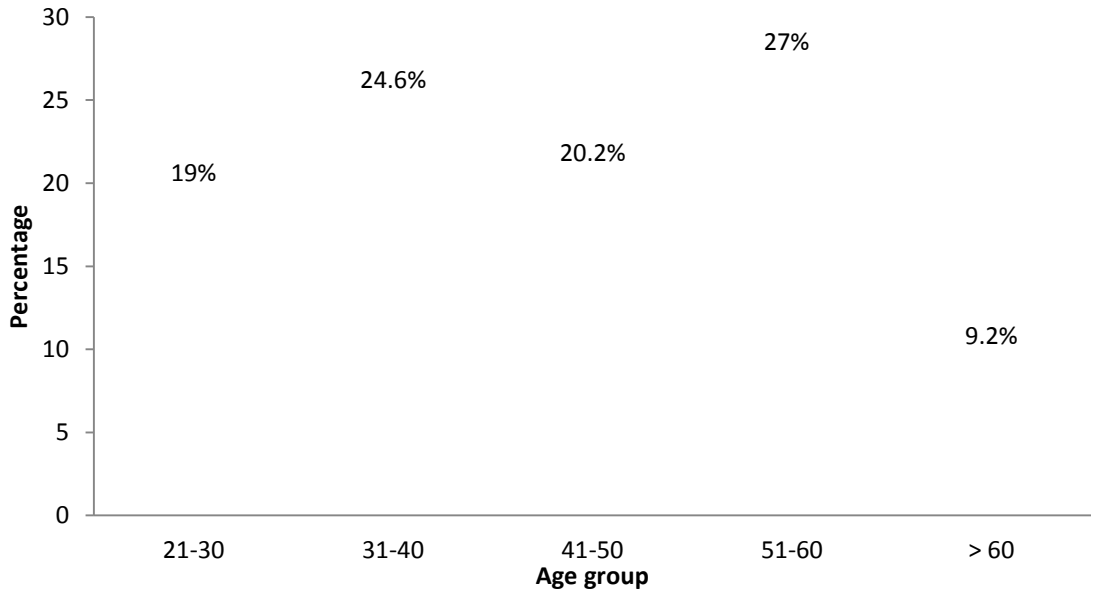

Figure 2: Age wise distribution of the population

Table 3:Education wise distribution

S.No	Education	Total number of participants (n=500)
1	Illiterate	140(28%)
2	Primary	86(17.2%)
3	Secondary	97(19.4%)
4	Higher secondary	93(18.6%)
5	Graduate and above	84(16.8%)

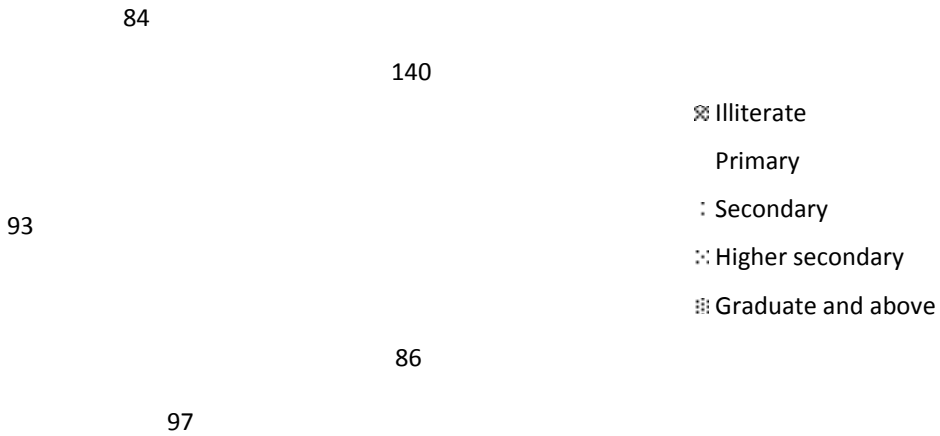

Figure 3:Education wise distribution

Table 4: Occupation wise distribution

S.No	Occupation	Total number of participants (n=500)
1	Employed	236(47.2%)
2	Unemployed	21(4.2%)
3	Retired	36(7.2%)
4	Student	52(10.4%)
5	Home duties	155(31%)

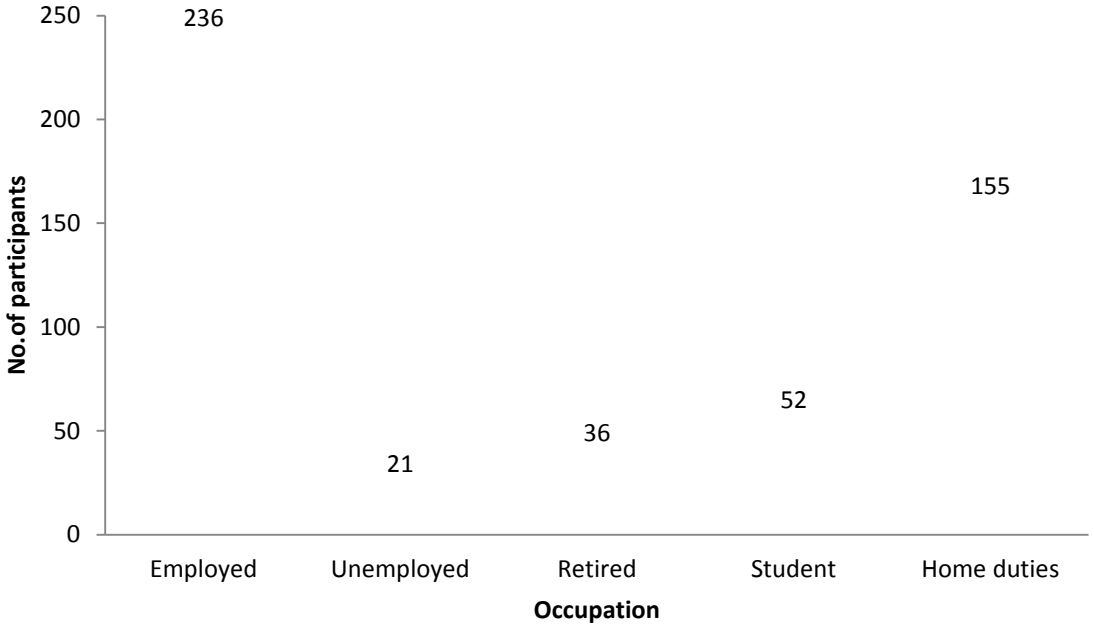

Figure 4: Occupation wise distribution

Table 5: Experience of dengue infection

S.No	Experience	Total number of participants (n=500) Yes
1	Yourself	75(15%)
2	Immediate family/partner	103(20.6%)
3	Work colleague	24(4.8%)
4	Close friend	15(3%)
5	Social acquaintance	315(63%)

Multiple responses

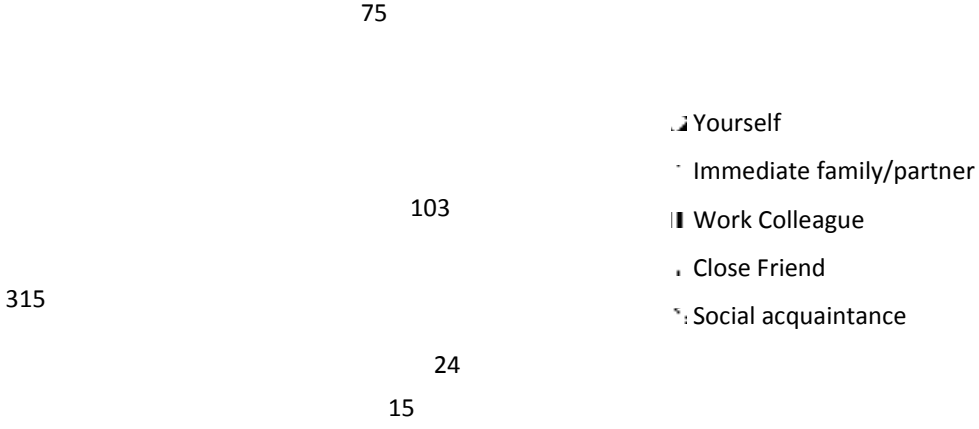

Figure 5: Experience of dengue infection

Table 6: The health educator visited home and provided education about dengue fever

S.No	Educated about dengue by health worker	Total number of participants (n=500)
1	Yes	198(39.6%)
2	No	302(60.4%)

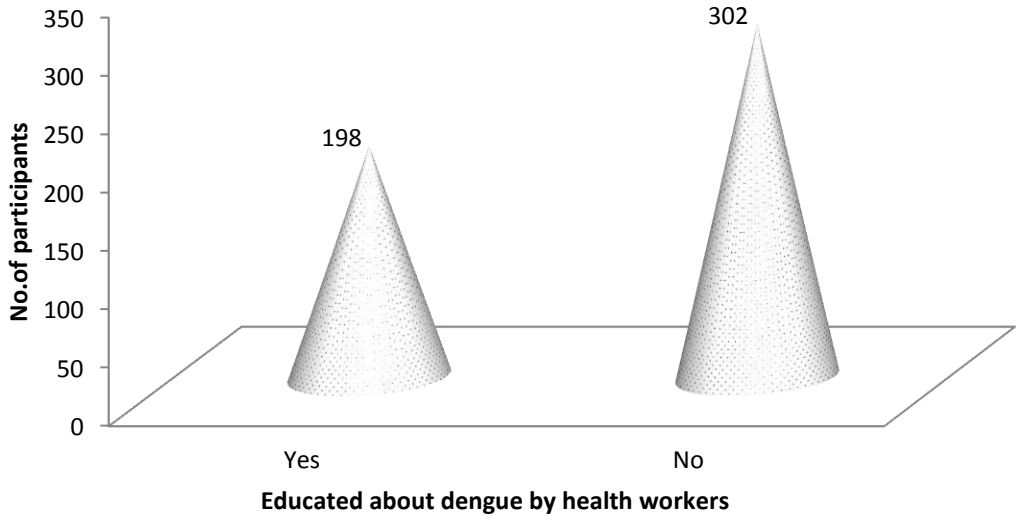

Figure 6: The health educator visited home and provided education about dengue fever

Table 7: The government sprays insecticide for controlling mosquitoes

S.No	Preventive measures	Total number of participants (n=500)
1	Yes	402(80.4%)
2	No	98(19.6%)

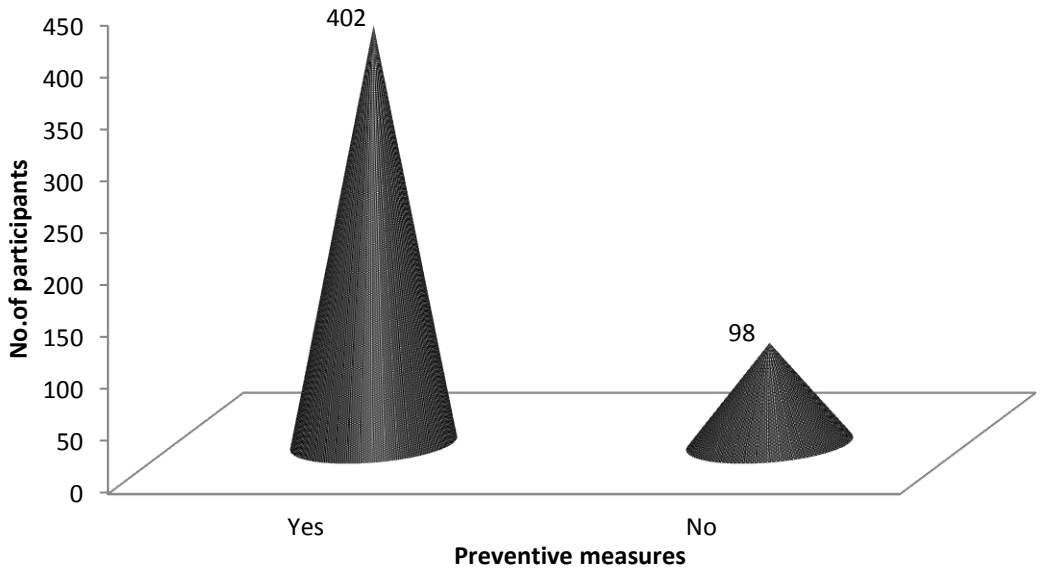

Figure 7: The government sprays insecticide for controlling mosquitoes

Table 8: Knowledge of symptoms of dengue fever

S.No	Symptoms	Yes	No	Don't Know
1	Is fever a symptoms of DF	432(86.4%)	27(5.4%)	41(8.2%)
2	Is headache a symptom of DF	406(81.2%)	35(7%)	59(11.8%)
3	Is joint pain a symptom of DF	385(77%)	29(5.8%)	86(17.2%)
4	Is muscle pain a symptom of DF	321(64.2%)	68(13.6%)	111(22.2%)
5	Are nausea/vomiting symptom of DF	379(75.8%)	39(7.8%)	82(16.4%)
6	Is rash a symptom of DF	99(19.8%)	218(43.6%)	183(36.6%)
7	Is diarrhoea common in DF	102(20.4%)	248(49.6%)	150(30%)
8	Is stomach Pain common in DF	188(37.6%)	207(41.4%)	105(21%)
9	Is pain behind the eyes common in DF	132(26.4%)	140(28%)	228(45.6%)

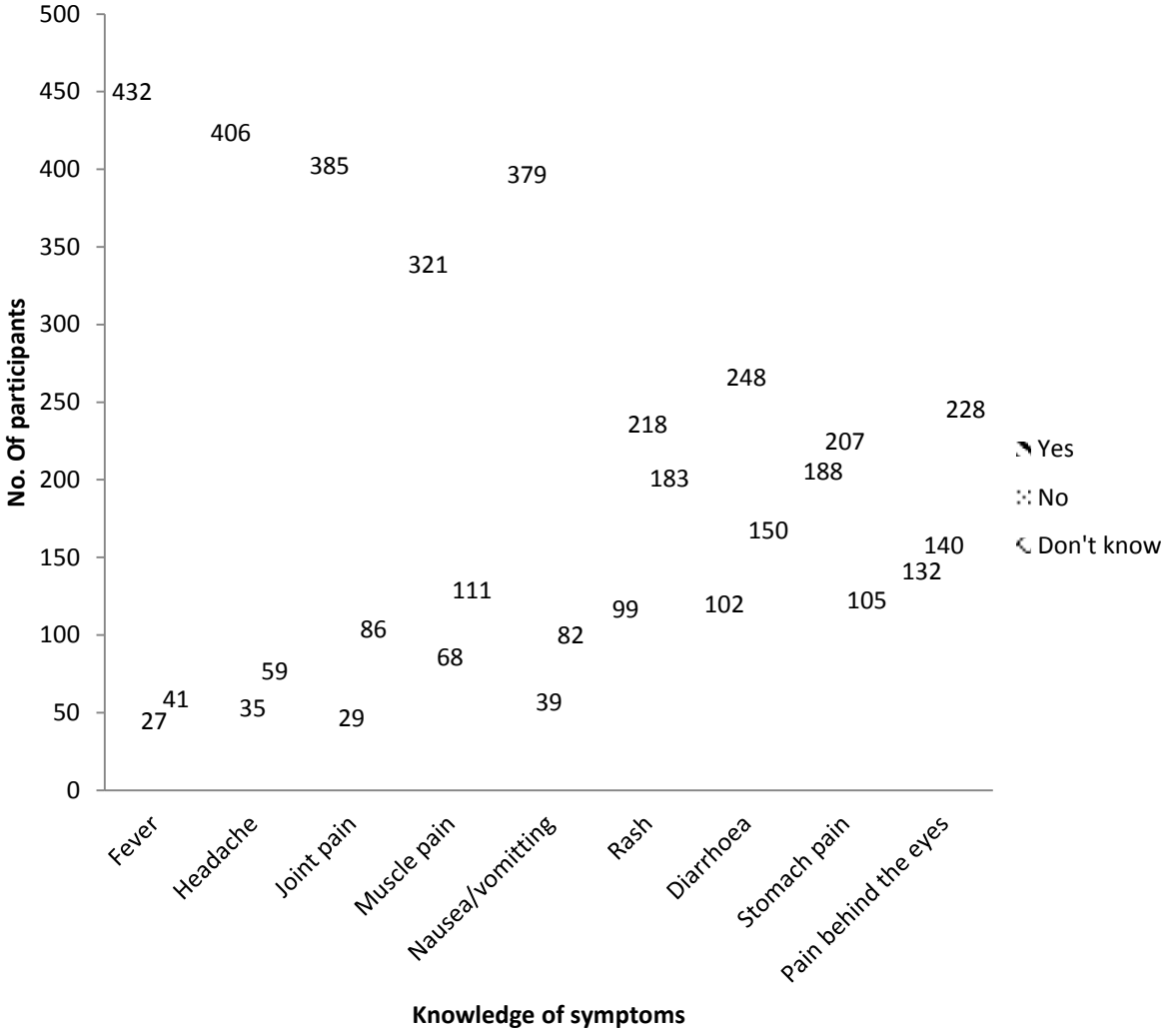

Figure 8: Knowledge of symptoms of dengue fever

Table 9: Knowledge of transmission of dengue fever

S.No	Transmission	Yes	No	Don't Know
1	Can all mosquito transmit DF	75(15%)	291(58.2%)	134(26.8%)
2	Do the Aedes mosquitoes transmit DF	56(11.2%)	104(20.8%)	340(68%)
3	Do files transmit DF	62(12.4%)	266(53.2%)	172(34.4%)
4	Do bugs/ticks transmit DF	87(17.4%)	272(54.4%)	141(28.2%)
5	Does person to person contact transmit DF	133(26.6%)	168(33.6%)	199(39.8%)
6	Is DF transmit by food and water	169(33.8%)	212(42.4%)	119(23.8%)
7	Can DF be transmit by blood transfusion	89(17.8%)	187(37.4%)	224(44.8%)
8	Can DF be transmit by sexual intercourse	42(8.4%)	382(76.4%)	98(19.6%)
9	Can DF be transmit by cough	89(17.8%)	355(71%)	56(11.2%)
10	Mosquito can breed in clear standing water	180(36%)	211(42.2%)	109(21.8%)

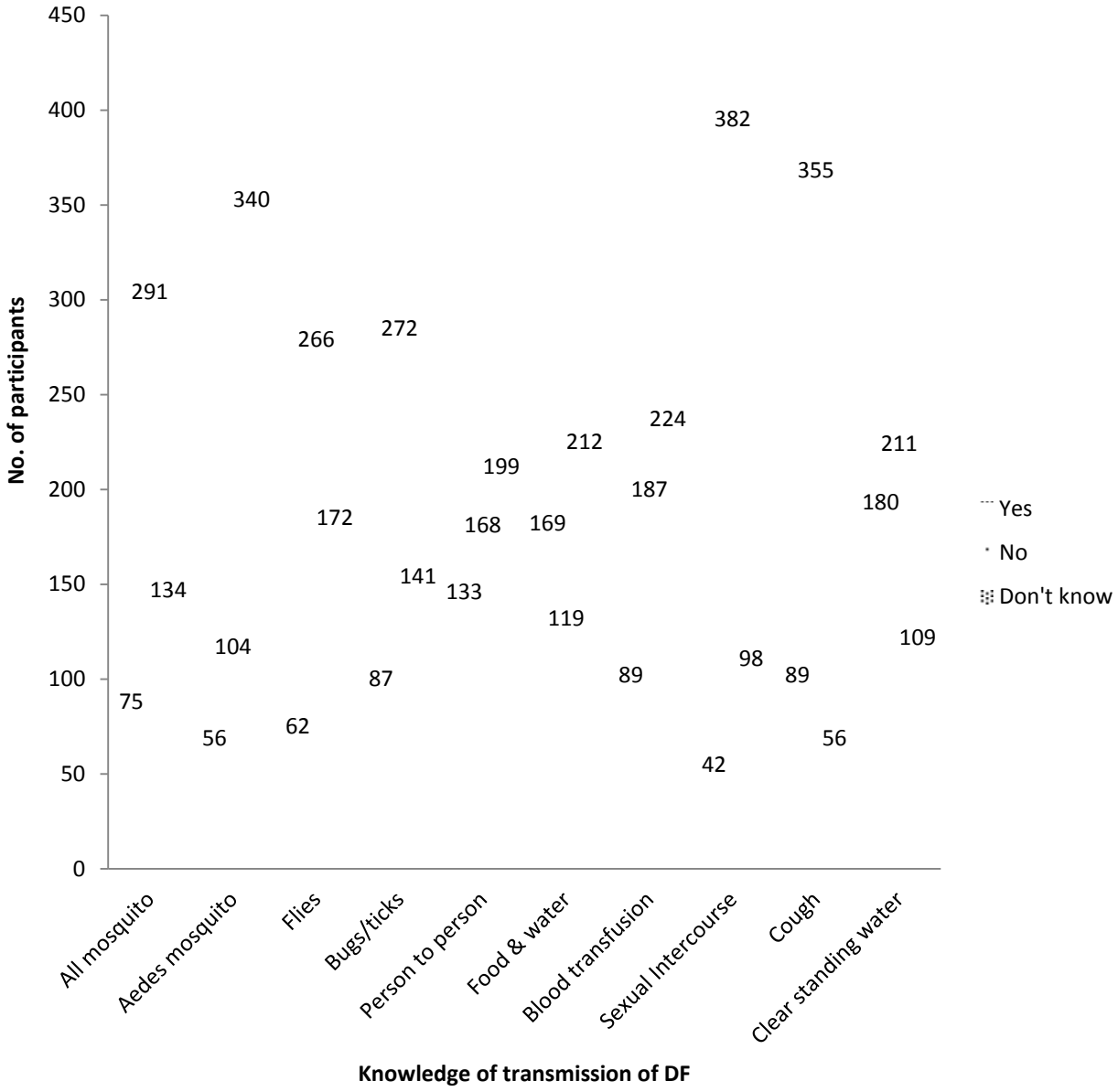

Figure 9: Knowledge of transmission of dengue fever

Table 10: Knowledge on mosquito breeding site

S.No	Breeding sites	Yes	No	Don't Know
1	Sewage water	299(59.8%)	164(32.8%)	37(7.4%)
2	Container under air conditioner	106(21%)	178(35.6%)	216(43%)
3	Swamps and ponds	48(9.6%)	359(71.8%)	93(18.6%)
4	Discarded utensils	96(19.2%)	87(17.4%)	317(63.4%)
5	Tyres	364(72.8%)	51(10.2%)	85(17%)
6	Uncovered water tanks	100(20%)	321(64.2%)	79(15.8%)
7	Pots & bottles	272(54.4%)	112(22.4%)	116(23.2%)
8	Burrows & Pits	308(30.8%)	91(18.2%)	101(20.2%)
9	Coconut shell	371(74.2%)	53(10.6%)	76(15.2%)

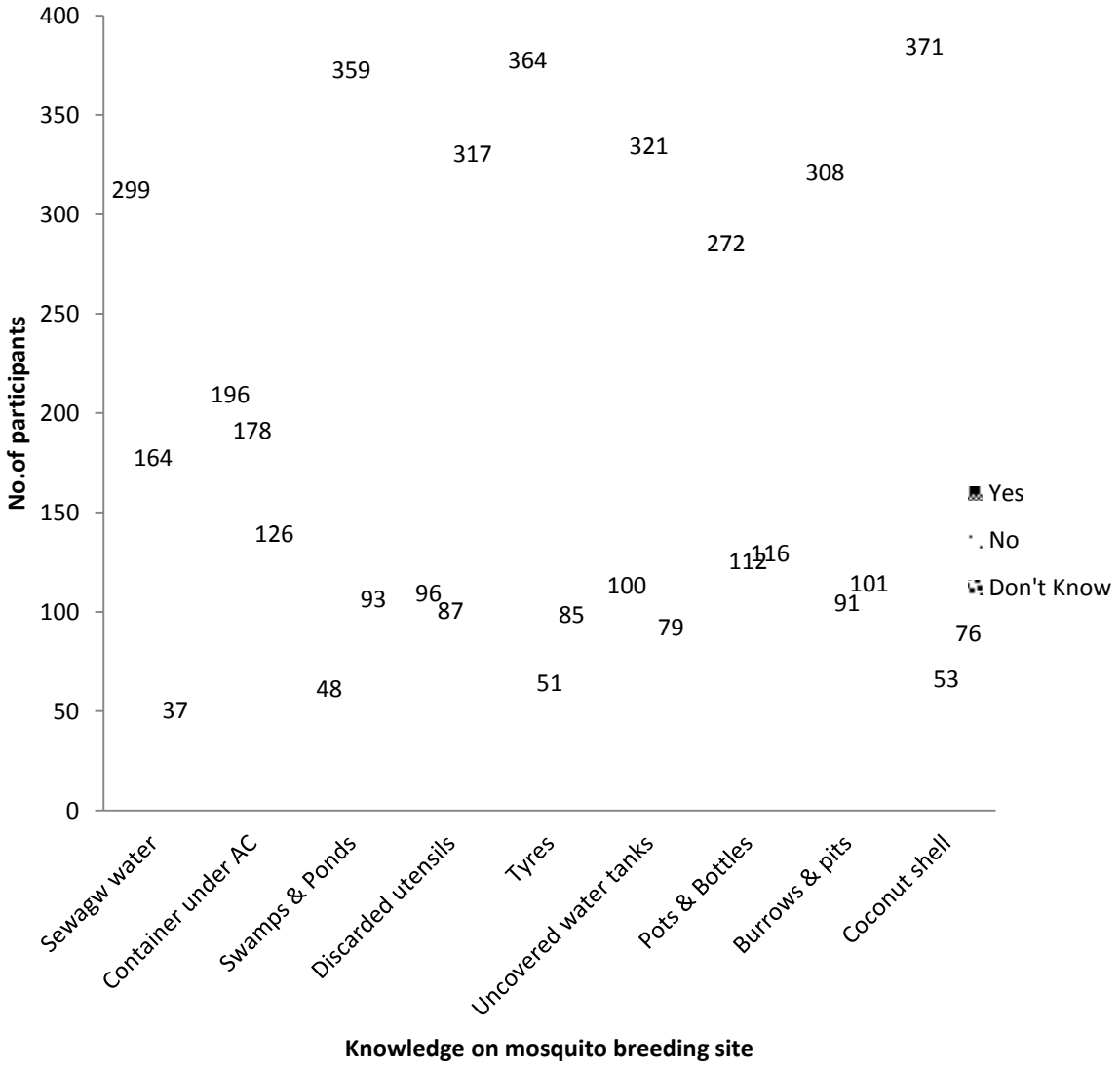

Figure 10: Knowledge on mosquito breeding site

Table 11: Knowledge of prevention of dengue fever/ Vector controlling methods

S.No	Prevention	Yes	No	Don't Know
1	Window screen and bed net reduce mosquito	312(62.4%)	163(32.6%)	25(5%)
2	Insecticidal spray reduce mosquitoes	252(50.4%)	192(38.4%)	56(11.2%)
3	Tightly covering water container reduce mosquitoes	123(24.6%)	332(60.4%)	45(9%)
4	Removal of standing water can prevent breeding	115(23%)	356(71.2%)	29(5.8%)
5	Mosquito repellents prevent mosquito bites	303(60.6%)	178(35.6%)	22(4.4%)
6	Pouring chemicals in standing water can kill mosquito larvae	188(37.6%)	205(41%)	107(21.4%)

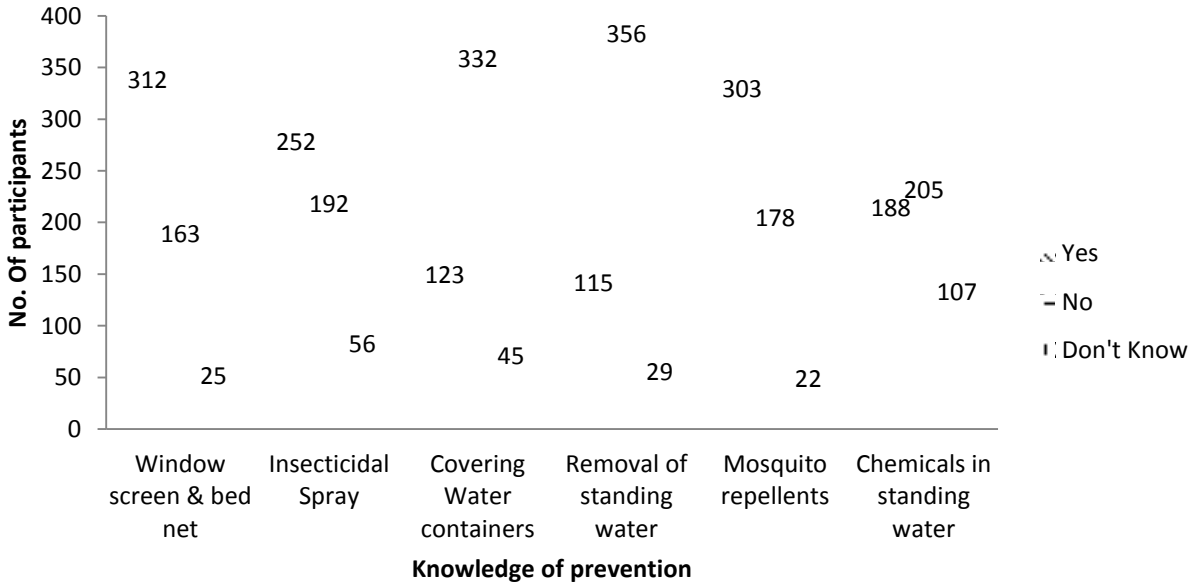

Figure 11: Knowledge of prevention of dengue fever/ Vector controlling methods

Table 12: Knowledge on Aedes mosquito's biting time

S.No	Biting time	Yes	No	Don't Know
1	Morning	131(26.2%)	120(24%)	249(49.8%)
2	Afternoon	50(10%)	185(37%)	265(53%)
3	Evening	169(33.8%)	176(35.2%)	155(31%)
4	Night	239(47.8%)	135(2.7%)	126(25.2%)

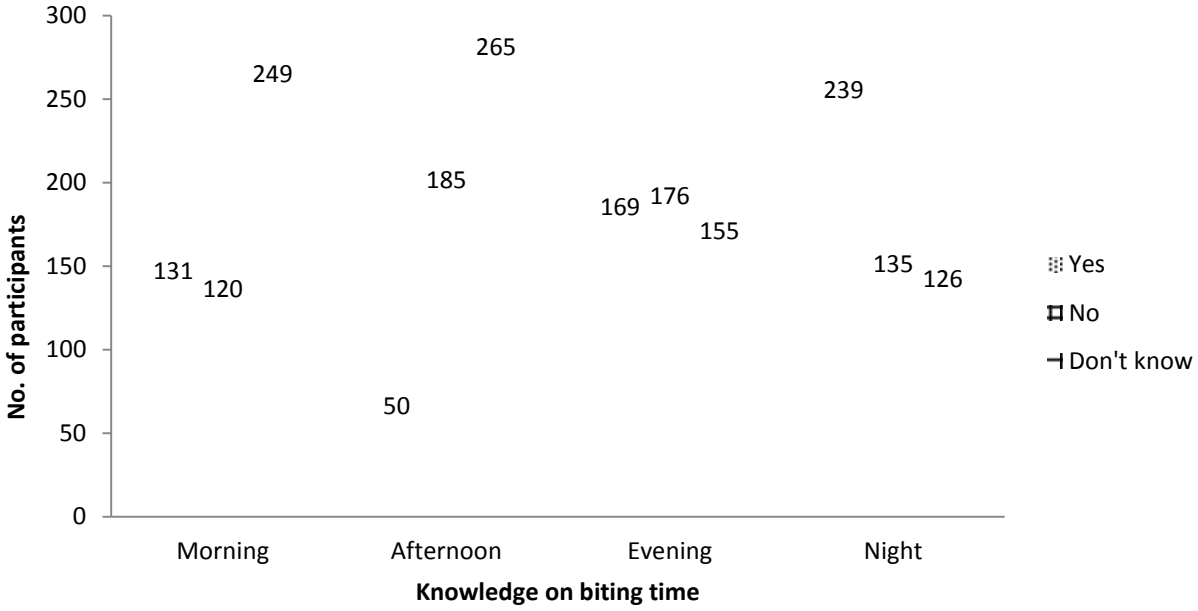

Figure 12: Knowledge on Aedes mosquito's biting time

Table 13: Knowledge on DF treatment

S.No	Treatment	Yes
1	Curable	281(56.2%)
2	Non-curable	219(43.8%)

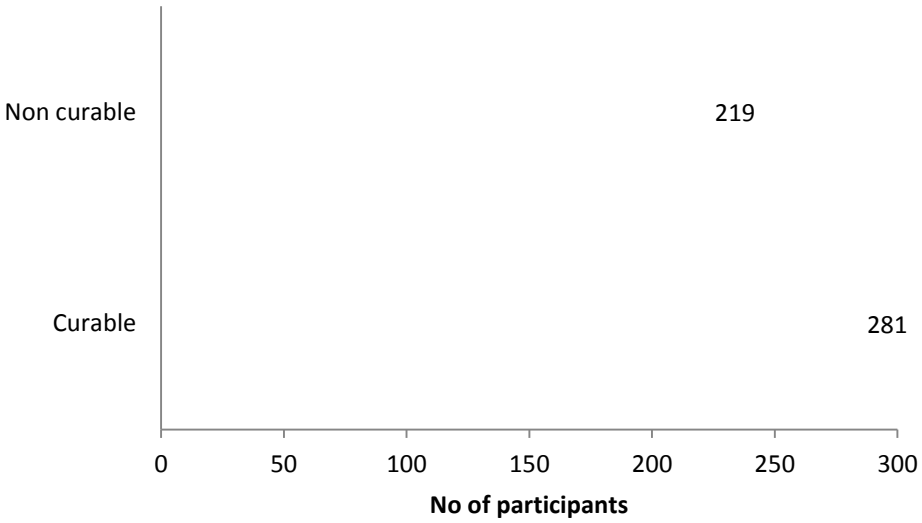

Figure 13: Knowledge on DF treatment

Table 14: Attitude towards dengue fever

S.No	Attitude	Strongly agree	Agree	Not sure	Disagree
1	Is DF a serious disease	190(38%)	135(27%)	85(17%)	90(18%)
2	Are you at risk of getting DF	175(35%)	99(19.8%)	110(22%)	116(23.2%)
3	DF can be treated at home	21(4.2%)	55(11%)	34(6.8%)	390(78%)
4	Can DF be prevented	197(39.4%)	73(14.6%)	90(18%)	140(28%)
5	Is controlling the breeding places of mosquitoes a good strategy to prevent DF	110(22%)	98(19.6%)	124(24.8%)	168(33.6%)
6	Do you think communities should actively participate in controlling mosquitoes	139(27.8%)	142(28.4%)	91(18.2%)	128(25.6%)

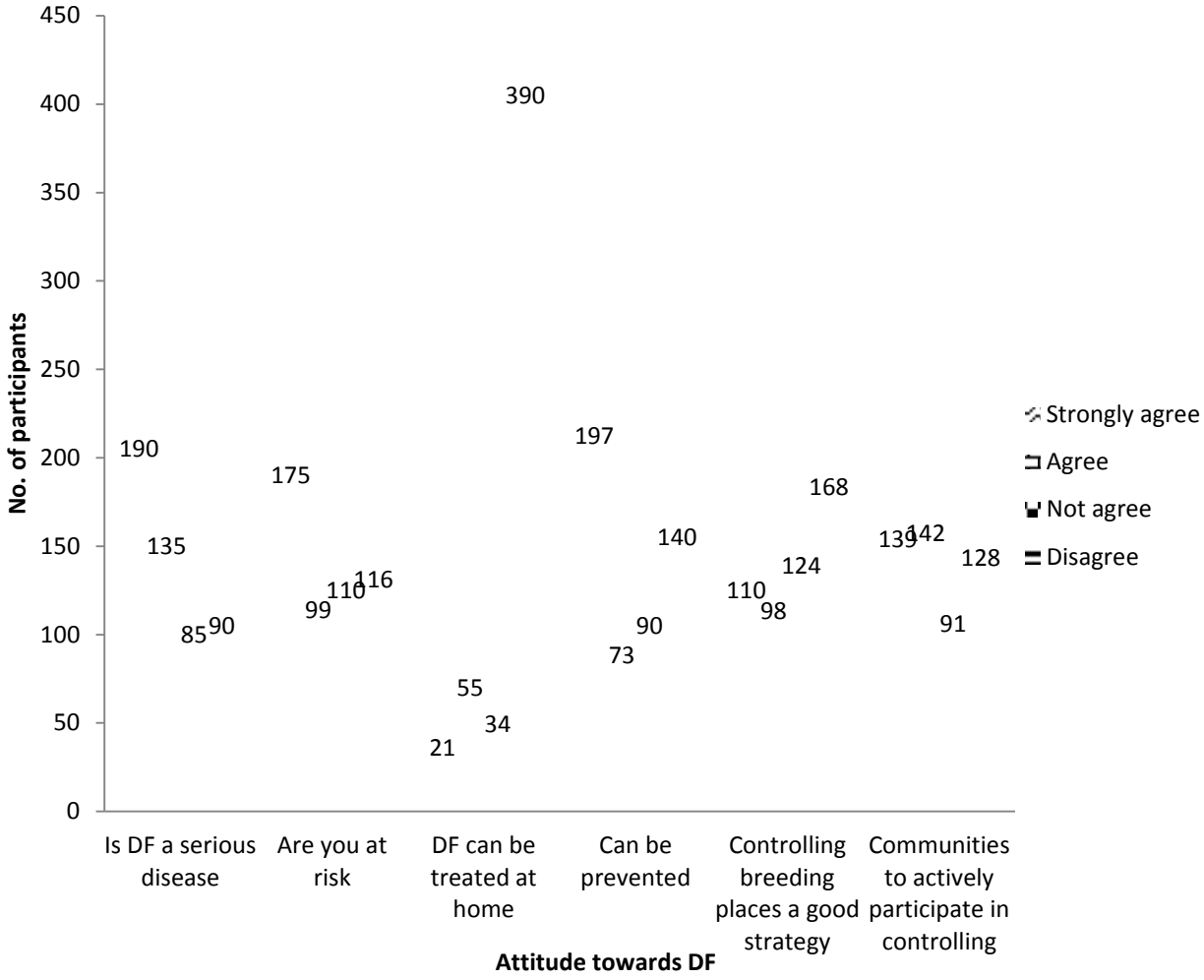

Figure 14: Attitude towards dengue fever

Table 15: Sources of information about dengue

S.No	Sources of Information	Total number of participants
1	Radio/television	380(76%)
2	Health worker	142(28.4%)
3	Relatives	110(22%)
4	Friends	89(17.8%)
5	Newspaper/ Magazine	200(40%)
6	Brouches/ Pamphlets	59(11.8%)
7	Mass meeting	30(6%)

Multiple responses

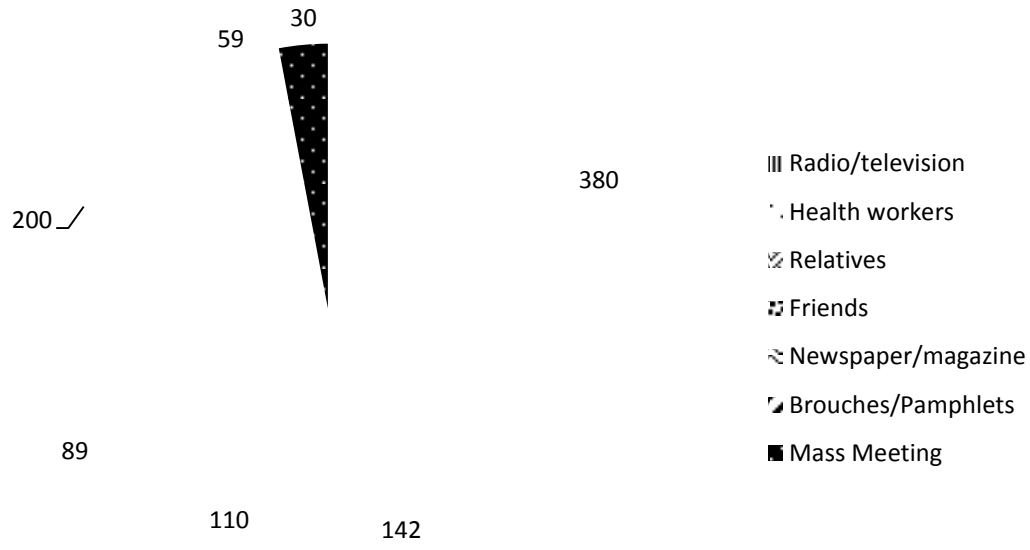

Figure 15: Sources of information about dengue

Table 16: Preventive practices towards dengue

S.No	Practices	Always	Often	Sometimes	Never
1	Frequency of cleaning water filled containers	89(17.8%)	219(43.8%)	163(32.6%)	29(5.8%)
2	Frequency of cleaning ditches around the home	09(1.8%)	20(4%)	72(14.4%)	399(79.8%)
3	Frequency of drinking nilavaembu kasayam	18(3.6%)	51(10.2%)	291(58.2%)	140(28%)
4	Eliminate standing water around the house	50(10%)	117(23.4%)	225(45%)	108(21.6%)
5	Covered water containers in the home	356(71.2%)	89(17.8%)	52(10.4%)	03(0.6%)

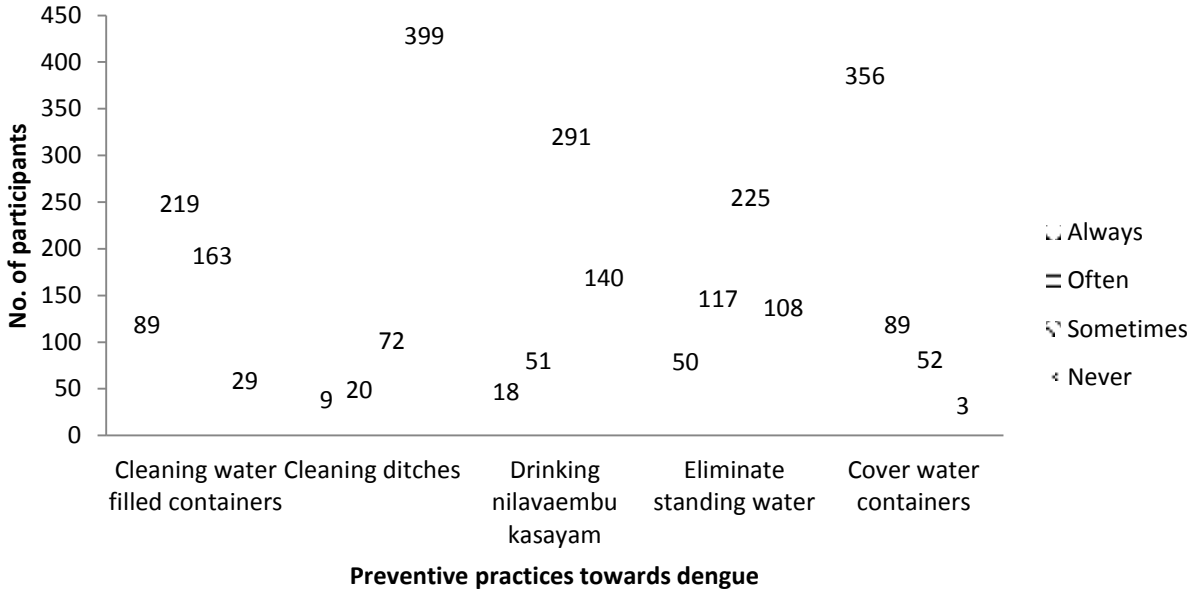

Figure 16: Preventive practices towards dengue

Table 17: Preventive practices towards dengue fever

S.No	Preventive measures to mosquito-man contact	Yes	No
1	Use insecticide spray	85(17%)	415(83%)
2	Use screen windows	212(42.4%)	288(57.6%)
3	Use mosquito coil	357(71.4%)	143(28.6%)
4	Use mosquito net	189(37.8%)	311(62.2%)
5	Use mosquito repellent/ cream	38(7.6%)	462(92.4%)
6	Use mosquito electric bat	392(78.4%)	108(21.6%)
7	Use of fan to drive away mosquito	492(98.4%)	08(1.6%)
8	Use of smoke to drive away mosquito	11(2.2%)	489(97.8%)
9	Covering body with clothes	284(56.8%)	216(43.2%)

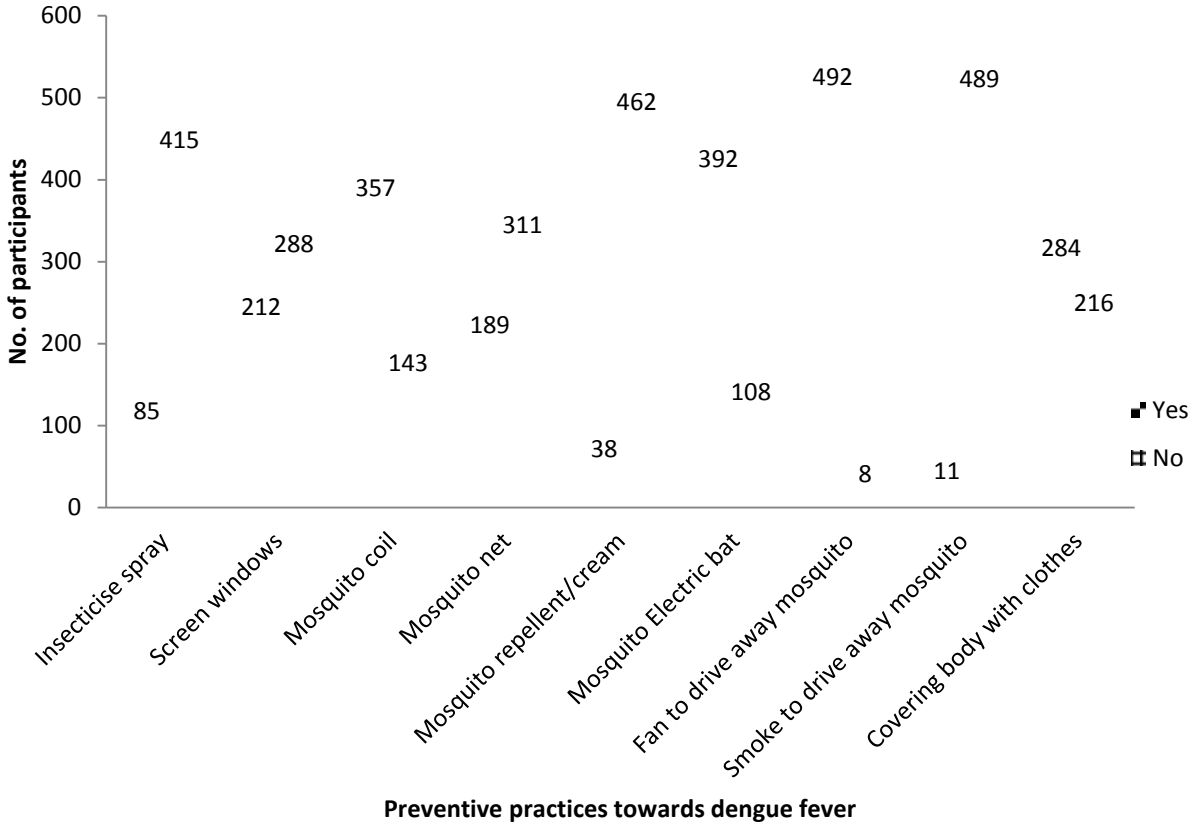

Figure 17: Preventive practices towards dengue fever

Discussion

7. DISCUSSION

Dengue fever is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death.Dengue is the fastest growing mosquito-borne disease across the world today, causing nearly 400 million infections every year.Dengue is endemic in all states and union territories (UTs) of India. In 2015, a total of 99 913 dengue cases and 220 deaths were reported from 35 states and UTs.[39]

Demographic and social parameter

The study was initiated in July 2017 and was completed in February 2018 at rural areas of Komarapalayam. Out of 515 participants, 15 were refused to participate in this study.A total of five hundred respondents were recruited (500) to participate in the investigation consisting of 196(39.2%) male and 304(60.8%) female (Table 1).

Age wise distribution among the study population is shown in Table 2. The age of the women participated in the study was above 21 years. More number of participants were seen in 51-60 years 135(27%), followed by 31-40 years 123(24.6%),41-50 years 101(20.2%), 21-30 years 95(19%) and least number in >60 years 46(9.2%).

The distribution of the participants by their level of education is shown in Table 3. Majority of the subjects were illiterates 28% followed by secondary 19.4%, higher secondary 18.6%, primary education 17.2% and least in graduates 16.8%.The majority of the study subjects were employed 47.2% and home maker 31%. The distribution of subjects by occupation is shown in Table 4.

Our study respondents had shared their experience of dengue infection (Table 5), majority by social acquaintance 63%, then by immediate family/partner 20% and your-self by 15%.Our current study illustrates that only 15%of the respondents have a prior history of DF. Thispresumably justify that the respondents could notpoint out typical symptoms of dengue becausethey had not witnessed a case from a close relativeor community's member nor had they personallyexperienced the disease. A study by Binsaeed *et al.,*[40] showed that only 3.5% of the respondents have a prior history of DF.

This in turn means thatthe disease may easily be undetected or confusedwith other similar causes of fever like influenza,typhoid, etc. leading to delays in accessing healthcare centres and eventually to DF complications.[41]Few participants were aware about some symptoms that may be due to their experience from immediate family members/partners have been affected with dengue.

The health educator visited home and provided education about dengue fever is given in Table 6. Majority respondents had replied no 60.4% then yes 39.6%.Respondents were replied yes 80.4% and no 19.6% for preventive measures had done by government like spray insecticide for controlling mosquitoes.This indicates that healthprofessionals in this area were notadequately mobilized for awareness raising programmesand communicating correct information about DF and its prevention, but preventive measures had been undertaken by government.

Knowledge of dengue infection

Symptom:

Among 500 respondents in Table 8, 86.4% was accepted yes for fever as a symptom of dengue, 81.2% replied yes for the symptom headache,77% for joint pain, 64.2% for muscle pain, and 75.8% for nausea /vomiting as a symptom of dengue fever. 36.6% had answered don't know and 43.6% replied no for rash a symptom of dengue. 49.6% had answered noand 30% don't know for diarrhoea, 41.4% no and 21% don't know for stomach pain and 28% no, and 45.6% don't know for pain behind the eyes as symptom of dengue fever. The majority of respondents were aware of at least one sign or symptom of dengue. Their ability to recognise the signs and symptoms of dengue is important for them to seek early treatment.[42]A study done in Nepal identified similar findings.[43]

Most respondents were not able to correctly relate the symptoms of dengue apart from a few (fever, headache, joint pain, muscle pain and nausea/vomiting)becauseparticipants had not personally experienced the disease, nor witnessed a case from a closerelative or friend.[41]

Transmission

Knowledge of transmission of dengue fever is given in table 9. 58.2% said no and 26.8% replied don't know, for a question, can all mosquito transmit dengue fever. Do the Aedes mosquito transmit DF question 68% replied don't know and 20.8% said no. Among othertransmission, majority, 53.2% replied no for do flies transmit DF, 54.4% said no for do bugs/ticks transmit DF, 39.8% don't know fordoes person to person contact transmit DF, 42.4% don't know for is DF transmit by food and water, 44.8% don't know for can DF be transmit by blood transfusion, 76.4% no for can DF be transmit by sexual intercourse,71% no for can DF be transmit by cough, and 42.2% no for mosquito can breed in clear standing water.

A good percentage of participants (58.2%) knew that not all mosquitoes can transmit dengue but only few (11.2%) knew that Aedesmosquitoes transmit it. On the other hand, more than halfof the participants were aware of the fact that flies 53.2% andticks 54.4% do not transmit dengue. Although our study showed a little less knowledge amongrespondents about different transmission of DF whencompared to a study done by Itrat*et al*., in a cosmopolitan city.[44]The reason for the difference might be attributed tothe low literacy level among participants. Some misconceptions may affect the practicesof local populations for the prevention and controlof the disease, which could be either poor or insufficient.Therefore, correction of mistakenly perceived modes oftransmission should be considered to guide the healthauthorities for adapting forthcoming interventions forpromoting best practices among populations of endemicareas.[45]

Knowledge on mosquito breeding site is given in Table 10. Majority of the respondents replied yes for sewage water 59.8%, tyres 72.8%, pots & bottles 54.4%, burrows & pits 61.6% and coconut shell 74.2% except container under air conditioner 43%, discarded utensils 63.4% where they had replied don't know and swamps & ponds 71.8%, and uncovered water tanks 64.2% had replied no for mosquito breeding site. Bridging this gap in knowledge in vector biology is important in planning and designing programs and activities to educate rural residents on preventive measures to combat dengue. [40]

The details of responses of the participants related to vector controlling methods are shown in Table 11. Majority of the respondents replied no for tightly covering water container reduce mosquitoes 60.4%, removal of standing water can prevent breeding 71.2%, pouring chemicals in standing water can kill mosquito larvae 41% and others who gave correct answer as yes for window screen and bed net reduce mosquito 62.4%, insecticidal spray reduce mosquitoes 50.4% and mosquito repellents prevent mosquito bites 60.6%. Most of the results of mosquito breeding site and vector controlling methods were correlate with the study by Shuaib*et al*.[41]Itrat*et al*.,[44] in Pakistan revealed that mosquito sprays was considered the most common choices for prevention. However, fewer rates of perception were found regarding the role of cutting trees near houses, evaporation and smoldering and using repellent creams as preventive measures contributing to the reduction of dengue-transmitting mosquitoes.[45]A case control study indicated that water storage container facilities in or near construction sites were the focal point of dengue virus transmission in Jeddah.[46]

Most of the participants replied don't know for Aedes mosquito biting time (Table 12), as 49.8% morning, 53% afternoon. The others replied no (35.2%) for evening time and 47.8% yes for night time.Similar results were found in another study.[37]World Health Organization pointedout that Aedes mosquito usually bites during theday.[19]Dengue treatment must address onlythe signs and symptoms because there is no specific drug for this disease and Aedes aegyptihabitually bite in the daytime. Majority of our respondents were unaware of Aedes mosquito biting time.

Knowledge on DF treatment is given in Table 13. Among 500 participants, 43.8% replied yes for DF as non-curable and 56.2% reported as curable.This showed similarity with a study by Binsaeed *et al*., that 60% of them agreed as DF as curable.[40]

Attitude towards DF is given in Table 14. Is DF a serious disease 38% strongly agree, 27% agree, 17% not sure and 18% disagree. Are you at risk of getting DF 35% strongly agree, 22% not sure and 23.2% disagree. 78% disagree for DF can be treated at home. 39.4% strongly agree and 28% disagree for can DF be prevented. 33.6% disagree and 24.8% not sure for controlling the breeding places of mosquitoes a good strategy to prevent DF.Do you think communities should actively participate in controlling mosquitoes 27.8% strongly agree, 28.4% agree and

25.6% disagree. Similar results were found by other author. [37]This is indicative of the fact thatgeneral public is very much responsible as almost 90% ofthem thought that everybody should actively participatein controlling mosquitoes. [37]

Sources of information about dengue are given in Table 15. 76% of participants received information from radio/television, followed by40% from newspaper/magazine, 28.4% from health worker, 22% from relatives, from friends, 17.8% from friends, 11.8% from brouches/pamphlets and 6% from internet.Most respondents in our study reported thattelevision and radio had been their predominant sourcesof information on DF.Similar findings were reported fromJamaica, Laos and the Philippines.[41,47, 48]

The reason for information delivery via television being a significant predictor of adequate dengue knowledge could be that television is the most popular form of media that appeals to every socioeconomic class, including the literate and the illiterate, and every age group in our part of the world. [48]

Preventive practices toward dengue are given in Table 16. Respondents replied, 43.8% often, 32.6% sometimes, 17.8% always and 5.8% never for frequency of cleaning water filled containers. In contrast 79.8% never, 14.4% sometimes for frequency of cleaning ditches around the home. 58.2% sometimes and 28% never for drinking nilavaembu kasayam.Eliminating standing water around the home 45% replied sometimes, 23.4% often and 21.6% never. 71.2% replied always for covering water containers in the home.The most common practice to prevent mosquito breeding was found to be the disposing of water from breeding containers. This is in accordance with the finding of Dhimal*et al*., in Nepal where 91% of the participants cited this practice to be useful in reducing the number of mosquitoes.[43] In Thailand, a survey of KAP of the prevention of DHF pointed out that covering water container was the most common practice to prevent mosquito breeding in drinking-water containers.[49]But our participants were practiced without having this knowledge.

Preventive practices towards DF are given in Table 17. Majority of respondents replied no for preventive measures by mosquito-man contact by insecticide spray 83%, screen windows 57.6%, mosquito net 62.2%, mosquito repellent/cream 92.4%,smoke to drive away mosquito 97.8% and

other replied yes for using mosquito coil 71.4%, electric bat 78.4%, fan to drive away mosquito 98.4%, and covering body with clothes 56.8%.Mohapatra*et al*., also showed the similar results. [37]With the exception of the good practices of coveringwater containers, drying watercollections around houses, and other preventive practices arestill not adopted by about a half of respondents.This is in similar to the finding by Alyousefi1*et al.,*[45] where a low educational levelwas a predictor of poor practices against dengue feveramong rural populations in Yemen.

In this study, the reported use of preventivemeasures were found to be poor than the knowledge. This result is in contrast with astudy done in Thailand.[50]Oneof the reasons for few good practice levels attained in thisstudy may be that many questions on practice level wererelated to daily practices for the control of other commonmosquito borne diseases in this area like malaria andmosquito nuisance in general.[37]In fact, malaria prevalence in thestudy areas could contribute to mistaken beliefs aboutthe transmission of dengue fever by the same vectorAnopheles mosquito. Therefore, differences in the characteristics,biting behaviours and habitat between malariaand dengue vector mosquitoes should be consideredwhen tailoring educational campaigns to local communitiesabout the prevention and control of dengue fever.

Most of our respondents were illiterate and had less previous history of dengue infection. So they had very less knowledge or awareness towards dengue infection and obviously very less practice.Overall in our study, we found that average knowledge, good attitude and poor practice towards dengue.

Limitation

8. LIMITATION

This study has certain limitations which must be taken into consideration when interpreting the results. First, our assessments of attitudes and practices toward vector-borne diseases and vector control have relied on self-reported data collected through interviews and could potentially be affected by social desirability bias. However, the low practice scores obtained by the majority of our participants indicate that this may not be so. It is possible that some respondents might have provided socially desirable responses to some questions, especially in the attitude domain, since the survey was conducted by an interviewer base use of a structured questionnaire. Thismight have a potential limitation when interpreting certain knowledge items. In other words, it is not necessary that one answer should be correct for all participants.

Conclusion

9. CONCLUSION

- To conclude, most of the study population had experience dengue infection either in their family or social acquaintance.
- The health educator who was appointed by the government had provided information related to dengue and its prevention, but it was not reached to all the population in and around the village.
- Municipality has taken/initiated steps to controlling the mosquito and its breeding places but it was not a continuous process.
- The study population has acquired low level of good knowledge in symptoms, breeding sites, prevention and treatment towards dengue fever but very poor towards its mode of transmission and mosquitos biting time.
- The attitude of study population towards dengue shows good in response and the preventive practices were fair.
- Therefore, there is an urgent need for educational campaigns and social mobilizations to raise the awareness and to translate knowledge into sound practice of people of this area regarding DF.

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JKKN
College of Pharmacy

J.K.K.NATTRAJA ETHICS COMMITTEE
J.K.K.NATTRAJA COLLEGE OF PHARMACY

(MANAGED BY J.K.K.RANGAMMAL CHARITABLE TRUST)
Natarajapuram, NH-544 (Salem to Coimbatore),
Komarapalayam -638 183, Namakkal District, Tamil Nadu.

Ref: JKKNCP/ETHICS_PRACTICE/018PDS01 ***Date: 17.07.2017***

To
Mrs. K. Krishnaveni, M.Pharm, PhD.,
Department of pharmacy practice,
J.K.K. Nattraja College of Pharmacy,
Kumarapalayam – 638183,
India.

Dear Krishnaveni,

The proposal entitled **"KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS DENGUE FEVER AMONG THE POPULATION IN RURAL COMMUITY"** was reviewed by the ethics committee in its meeting held on 17.*07.2017* and permission is granted to you to carry out the study.

Thanking you,

Yours faithfully,

Dr. A. Sivakumar
Chairman of Ethics Committee

PRINCIPAL
J.K.K.NATARAJA DENTAL
COLLEGE & HOSPITAL
KOMARAPALAYAM - 638183

QUESTIONNAIRE

Name: **Age**:

Education:

No schooling

Primary

Secondary

Higher secondary

Graduate

Occupation:

House duties/ retired/ student / employed / unemployed

Experience of dengue infection

Yourself / Immediate family/partner / Work colleague / Close friend / Social acquaintance

Educated about dengue by health worker:yes / no

The government sprays insecticide for controlling mosquitoes: yes / no

Knowledge of symptoms of dengue fever

KNOWLEDGE	
Knowledge about risk factor for dengue fever	**Yes/no/don't know**
Is fever a symptoms of DF	
Is headache a symptom of DF	
Is joint pain a symptom of DF	
Is muscle pain a symptom of DF	
Are nausea/vomiting symptom of DF	
Is rash a symptom of DF	
Is diarrhoea common in DF	
Is stomach Pain common in DF	
Is pain behind the eyes common in DF	
Knowledge of transmission of dengue fever	**Yes/no/don't know**
Foul-smelling vaginal discharge (FSVD)	
Postmenopausal bleeding (PMB)	

Postcoital bleeding	
Irregular menstrual period	
Leakage of urine from vagina	
Weight loss	
Pelvic pain	
Transmission	**Yes/no/don't know**
Can all mosquito transmit DF	
Do the Aedes mosquitoes transmit DF	
Do files transmit DF	
Do bugs/ticks transmit DF	
Does person to person contact transmit DF	
Is DF transmit by food and water	
Can DF be transmit by blood transfusion	
Can DF be transmit by sexual intercourse	
Can DF be transmit by cough	
Mosquito can breed in clear standing water	
Knowledge on mosquito breeding site	**Yes/no/don't know**
Sewage water	
Container under air conditioner	
Swamps and ponds	
Discarded utensils	
Tyres	
Uncovered water tanks	
Pots & bottles	
Burrows & Pits	
Coconut shell	
Knowledge of prevention of dengue fever	**Yes/no/don't know**
Window screen and bed net reduce mosquito	
Insecticidal spray reduce mosquitoes	
Tightly covering water container reduce mosquitoes	
Removal of standing water can prevent breeding	

Mosquito repellents prevent mosquito bites	
Pouring chemicals in standing water can kill mosquito larvae	
Biting time	**Yes/no/don't know**
Morning	
Afternoon	
Evening	
Night	
Treatment	**Yes / No**
Curable	
Non-curable	
ATTITUDE	
Attitude towards dengue fever	**Strongly agree / agree/ not sure / disagree**
Is DF a serious disease	
Are you at risk of getting DF	
DF can be treated at home	
Can DF be prevented	
Is controlling the breeding places of mosquitoes a good strategy to prevent DF	
Do you think communities should actively participate in controlling mosquitoes	
PRACTICE	
Preventive practices towards dengue fever	**Always / often / sometimes / never**
Frequency of cleaning water filled containers	
Frequency of cleaning ditches around the home	
Frequency of drinking nilavaembu kasayam	
Eliminate standing water around the house	
Covered water containers in the home	

Preventive measures to mosquito-man contact	**Yes / No**
Use insecticide spray	
Use screen windows	
Use mosquito coil	
Use mosquito net	
Use mosquito repellent/ cream	
Use mosquito electric bat	
Use of fan to drive away mosquito	
Use of smoke to drive away mosquito	
Covering body with clothes	

SOURCES OF INFORMATION

Radio/television

Health worker

Relatives

Friends

Newspaper/ Magazine

Brouches/ Pamphlets

Mass meeting