No. DD (M)/Dengue/2015
GOVERNMENT OF THE PUNJAB
CHIEF MINISTER'S MONITORING FORCE
SCHOOL EDUCATION DEPARTMENT

Dated Lahore the 31st July, 2015

SUBJECT: INCLUSION OF QUESTION ON DENGUE IN EXAMINATIONS

Please refer to this office earlier letter No. DD(M)/Dengue/Vol-II/2013, dated 15th August, 2013 on the subject cited above.

2. I am directed to state that this Department is running anti-Dengue campaign throughout the province through active participation of field formation and educational institutions. For the purpose of proper teaching and awareness on Dengue, informative material has been made part of Curriculum and textbooks. The competent authority has desired that all Boards of Intermediate & Secondary Education in Punjab and the Punjab Examination Commission may ensure setting of Question on Dengue in Examinations to be conducted under their respective Board /PEC.

3. I am therefore, further directed to request you to ensure implementation of instructions of the Government. A report of action taken / compliance in this regard may kindly be communicated to this department for information of the high-ups.

ADDITIONAL SECRETARY (GENERAL)

CC:
- PS to Secretary School Education
- PS to Special Secretary, Schools.
GOVERNMENT OF THE PUNJAB
DENGUE FEVER AWARENESS CAMPAIGN

1. INTRODUCTION

1.1 What is Dengue Fever?

Dengue fever is an infectious disease transmitted by mosquito and caused by any of the four related dengue viruses. It is also called “break bone fever” because it may cause severe joint and muscle pain. Dengue is transmitted by female Aedes mosquito. Since no vaccine is available, prevention is the best remedy.

1.2 History

Dengue is one of the many viral diseases transmitted by the mosquito. The disease commonly breaks out in explosive epidemics that spread with amazing rapidity as seen in 2011 in Lahore. The disease has affected all warm parts of the world such as Pakistan, India, Sri Lanka, Bangladesh, Central Africa, Central America and China. It is a disease of monkeys transmitted to them by forest dwelling mosquitoes.

Outbreaks in human population presumably began when some of these

![Map of Aedes aegypti distribution](image)

**Fig.1: Geographical distribution of Aedes aegypti**

**Note:** English teacher can take help of science teacher if required
mosquitoes got the virus from monkeys and made way to human villages where they started breeding. Hence infected human beings carried the disease to cities where *Aedes* took over as the vector.

1.3 Occurrence and Geographical Distribution

Dengue was geographically restricted until the middle of 20th century. It was relatively a minor disease. During the 2nd world war, *Aedes* mosquitoes (eggs) were transported around the world with cargo and thought to have played a crucial role in the spread of virus. It was first properly documented in 1950's during epidemics in the Philippines and Thailand. It is found persistently in local populations (endemic) in more than 100 countries in Asia, America and Africa. World Health Organization (WHO) has estimated that 50 to 100 million infections occur every year.

2. SYMPTOMS

After an infected mosquito’s bite, incubation period of 4-7 days is required before the symptoms appear in the patient. The symptoms of different types of dengue fever are as follows:

2.1 Types of Dengue fever

These include:
- Asymptomatic or Undifferentiated fever
- Dengue fever (DF)
- Dengue Haemorrhagic fever (DHF)
- Dengue Shock Syndrome (DSS)

2.1.1 Asymptomatic or Undifferentiated fever

This is a type of fever which represents flu-like symptoms with mild fever.

2.1.2 Dengue fever

The temperature rises above 102°F with severe headache, backache, pain at the back of the eyes and joints, with nausea and vomiting.

2.1.3 Dengue Haemorrhagic fever (DHF)

It occurs in less than 5% of the patients. This is accompanied by extensive leakage of plasma. Very few cases show bleeding from nose, gums and rashes on the skin. There may be a decrease in

![Fig. 2: Rashes on skin](image)
heart rate, weak pulse and cool extremities. There is a rapid decrease in white blood cells (WBCs) and platelets. In some cases this may lead to DSS.

2.1.4 Dengue Shock Syndrome (DSS)
When a Dengue patient experiences shock, he has dengue shock syndrome. Both DHF and DSS patients need strict hospital monitoring and intensive care.

3. DIAGNOSIS
Complete blood count (CBC) showing total number of RBCs, WBCs and platelets per unit volume of blood is the basic diagnostic test.

4. DENGUE VIRUS
Dengue fever is caused by one of the four types of dengue virus, DEN-1, DEN-2, DEN-3 and DEN-4 which are called its serotypes.

In human beings
It enters the skin of the human through saliva of infected female Aedes mosquito, when it bites for a blood meal. It multiplies in the body cells such as WBCs and symptoms appear after 4-7 days.

In Mosquito
When a female Aedes bites a patient, it acquires virus. It multiplies in the body of the mosquito and is subsequently released in the saliva. The virus does not cause any disease in mosquitoes.

5. DENGUE VECTOR
The carrier of the dengue virus is Aedes mosquito. It is black in colour (up to 10 mm in size) with white spots on the body and legs and has shiny wings. Both the male and female mosquito feed on plant nectar, but only female can bite human as its mouth parts are designed for this purpose and bear stylet for sucking blood. The female mosquito needs to suck blood to lay eggs.

5.1 Life Cycle of Aedes mosquito and its comparison with Anopheles
A comparison between the different stages of the life cycle of two species of mosquitoes is given below.

5.1.1 Eggs
Female Aedes lays eggs, after having a blood meal, in clean standing water.
These eggs are black in colour, oblong in shape and are laid singly. Their number ranges from 50-300, depending upon the humidity and temperature.

Eggs of female Anopheles mosquito are oval in shape, laid singly on the surface of water.

![Life cycle of Aedes](image)

**Fig. 4: Life cycle of Aedes**

5.1.2. Larvae

In Aedes, larvae come out of the eggs after an incubation of 2-7 days, which hang vertically with siphon or breathing tube touching water surface. They move actively from top to bottom and feed on vegetation and larvae of other insects.

In Anopheles, the larvae rest parallel to the surface of water, they do not have siphon or breathing tube, but have pores or spiracles on body for breathing.

5.1.3. Pupa

In Aedes, the larva feeds, grows rapidly and casts (sheds) its skin four times and becomes a pupa. The pupa is comma shaped consisting of a large rounded anterior part (head and thorax) and an elongated narrow, curved, segmented abdomen. It does not feed but can swim actively.

5.1.4. Adult

After one or two days, outer covering of the pupa splits in the mid dorsal line and the young mosquito emerges, which after drying its wings flies away. Adults
usually rest with body parallel, though sometimes at an angle to the resting surface. It usually bites in the morning and before dusk.

The adult Anopheles is brownish in colour with no stripes. It sits more or less at an angle to the surface. It is usually active at night. Aedes carries the dengue virus while Anopheles is a carrier of Plasmodium which causes malaria.

5.2 Breeding Sites

Aedes mosquitoes breed in clean water which may accumulate in natural or artificial containers. The natural containers include tree holes, bamboo internodes and leaves while artificial containers include discarded bottles, food packaging, ice cream cups, dishes etc. Damaged appliances, discarded tyres, scrap cars, boats, utensils and tools, toys, buckets, room coolers, painting trays, holes in broken fences, roofs, floors, water storage tanks, barrels, jugs, pans and buckets are favourable breeding places. In short we should reduce every possibility of collection of water.
5.3 Transmission of Dengue

_Aedes_ mosquito itself does not have the ability to fly over long distance. The rapid rise in trade and travel across the world resulted in outbreaks of dengue epidemics in areas where it was previously absent (but the vector _Aedes_ is present), and can also be transmitted through blood transfusion and organ transplant.

6 PREVENTIVE MEASURES AND CONTROL

For the prevention of this disease it is very important that the Public awareness campaigns among masses should be launched, in addition to various precautionary measures taken at various levels.

6.1 At personal level

- People can prevent mosquito’s bites by wearing clothes that fully cover the skin.
- Use mosquito nets which are sprayed with insecticide
- Apply mosquito repellents.

6.2 At household level

Controlled spraying (considering side effects) of every part of the house, under the furniture, behind the curtains, dark corners, stores, and removing all junk items will eliminate the resting/breeding havens.

6.3 At community level

The surroundings of the house should be kept clean. No garbage or solid waste should be allowed to collect at any place. Spraying of insecticide/larvicide should be practiced.

Epidemics can be prevented or controlled by well-coordinated community efforts by increasing the awareness about dengue fever. People should learn to recognize and differentiate between three different stages of dengue fever (DF, DHF and DSS). They should also be able to differentiate between the _Anopheles_ and _Aedes_ mosquitoes, their breeding sites and ways of transmission of dengue virus. They should be aware of the control measures.

Awareness message can be given to the masses through print and electronic media i.e. radio, TV, newspaper etc. Teachers should also play their positive role by
informing their students about all the factors involved in the spread of the disease, and about its control. The students can spread this message to their home and family and also to the other members of their locality. Khatibs of mosques should spread this message among the public through their sermons. Market committees and unions can also be helpful in this regard.

6.4 Biological Control

The use of chemicals nowadays is being discouraged because of its hazards to the environment. The biological control is being favoured because of its harmless nature. Therefore presently the use of natural enemies and predators for the control of this disease is imperative.

- Many birds prey on mosquitoes.
- Wall lizards (geckos), jumping spiders destroy a number of mosquitoes.
- Certain fish are natural predator of mosquito larvae in ponds.
- Larvae of other insects also feed on larvae of mosquito.

7. PATIENT MANAGEMENT

- As in case of other viral diseases complete rest should be advised to the patient.
- Family doctor should be consulted, though there is no specific medication available.

Initially paracetamol should be taken to control fever. Drugs like aspirin and brufen should be strictly avoided.

- Patients should take plenty of fluid to avoid dehydration.
- Any person who is having fever for 3 or more days should consult a doctor.
- If the patient feel worse (like vomiting, severe abdominal pain or bleeding) he or she should be immediately shifted to the hospital for treatment.

8. GOVERNMENT’S EFFORTS TO CONTROL DENGUE

Government of the Punjab responded promptly to the epidemic. A very active multidirectional campaign was started to keep the disease under control. Teachers, students, doctors, paramedical staff, several Government departments and public representatives headed by the Chief Minister Punjab, took part in this campaign.
EXERCISE

Give Short answers of the following questions.
1. Differentiate between life cycle of *Aedes* and *Anopheles* mosquito.
2. Give important phases of the life cycle of *Aedes* mosquito.
3. What measures should be adopted to control mosquito propagation?
4. How can we protect ourselves from mosquito’s bite?
5. Name various sites where mosquitoes can breed.
6. What should be the role of a student in dengue control?
7. What are some common symptoms of dengue fever?
8. What do you know about biological control of mosquitoes?

Multiple Choice Questions
Choose the correct answer.

i. Dengue fever spread with rapidity in Lahore in:
   (a) 1990  
   (b) 1994  
   (c) 2004  
   (d) 2011

ii. The causative agent of Dengue is:
    (a) Mosquito  
    (b) Bacteria  
    (c) Virus  
    (d) House fly

iii. The vector for Dengue fever is:
     (a) Female *Anopheles*  
     (b) Male *Aedes*  
     (c) Female *Aedes*  
     (d) Male *Anopheles*

iv. Dengue is thought to have started from forest dwelling:
    (a) Parrots  
    (b) Rats  
    (c) Monkeys  
    (d) Deer

v. Female *Aedes* lays its eggs:
    (a) In clusters  
    (b) Singly  
    (c) In a batch of ten  
    (d) In a batch of fifty

Activity
1. Divide the class into batches of four. They should be given the task of finding out breeding sites of mosquitoes in different localities, e.g. in and around their school, home, and neighbourhood.
2. Group discussion among the students for control of dengue.