



Pharma Tab

(Special Edition water and vector borne diseases)

Department of Pharmacy Practice

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Different Causative Agents Promoting The Water Borne Diseases

**K. Karthickeyan, Asst. Professor,
Department of Pharmacy Practice**



Water borne diseases are viral, bacterial and parasitic diseases which use water as a common means of transmission. These diseases are among one of the major public health problems in developing countries. They are the leading causes of morbidity and mortality in all age groups particularly in children under 5 years of age. According to the World Health Organization (WHO) 3 million deaths occur every year from diarrheal diseases worldwide.

The problem of water borne diseases is especially prevalent where general hygiene and environmental sanitation are poor and where there is a

shortage of protected water supply. It is believed that 80% of all diseases in the world are caused by inadequate sanitation, polluted water or unavailability of water. Poverty, illiteracy, overcrowding and low health services are contributing factors that directly or indirectly affect the prevalence of water born diseases. Therefore an integrated prevention and curative approach with community participation is required in order to tackle this prevalent public health problem.

Diarrheal diseases are the leading cause of mortality and morbidity of children under five years of age. Estimated occurrence of diarrhea in developing countries accounts for 5 episodes per child each year in children less than 5 years of age. These young children are most at risk of water borne diseases because their immune systems are not fully developed. In

addition their resistance may be further impaired by malnutrition.

Typhoid fever occurs in all parts of the world where water supply and sanitation are sub-standard. It affects 17 million people worldwide with more than 600,000 deaths. Almost 80% of these cases and deaths are in developing countries.

Water-borne diseases are one of the major public health threats especially in developing countries, where unsafe water, sanitation problems and poor hygienic practices exist. The public health approach to the prevention and control of water-borne diseases should consist of three basic components:

- Provision of safe and adequate water supply.
- Improved sanitation.
- Hygiene education.

Etiologies of common water borne diseases is shown in the table:-

| Category of causative agent | Diseases | Causative organism | Common transmission route |
|-----------------------------|------------------------------|--|---------------------------------------|
| Bacterial | Shigellosis | Shigella species | Man-feces-(flies) water and food- man |
| | Typhoid fever | Salmonella typhi and paratyphi | Man- feces- food and water- man |
| | Cholera | Vibrio cholerae | Man- feces- water and food- man |
| | Acute Gastroenteritis | E. coli | Man- feces- water- man |
| Viral | Infectious hepatitis | Hepatitis A virus Hepatitis E virus | Man- feces- water and food- man |
| | Poliomyelitis | Polio virus | Man- feces- water- man |
| | Acute Gastroenteritis | Rota virus | Man- feces- water- man |
| Protozoal | Amebiasis | Entamoeba histolytica | Man- feces- water and food- man |
| | Giardiasis | Giardia lamblia | Man- feces- water and food- man |
| Helminths | Dracunculiasis (Guinea Worm) | Dracunculus medinensis | Man- water- man |

Leptospirosis

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Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*, a gram negative spirochete. Leptospirosis affects both animals and humans. Humans can get infected through direct contact with urine of infected animals or with a urine contaminated environment. The bacterium enters through cuts, scraped, worn area or through mucous membrane from the eyes, nose, sinuses, and mouth. The bacteria multiply in the liver, kidney and central nervous system. Pregnant women (early pregnancy) who become infected have a high rate of fetal mortality.

Risk factors include occupations that expose people to farm animals, wild animals, and to contaminated water and soil (farmers, slaughterhouse workers, veterinarians, miners, military personnel, disaster workers and victims, for example). People who participate in outdoor activities like camping or kayaking are also at higher risk for infection. Any exposure to sewage or animal waste increases risk of getting leptospirosis. sinuses, and mouth. The bacteria multiply in the liver, kidney and central nervous system. Pregnant women (early pregnancy) who become infected have a high rate of fetal mortality.

Risk factors include occupations that expose people to farm animals, wild animals, and to contaminated water and soil (farmers, slaughterhouse workers, veterinarians, miners, military personnel, disaster workers and victims, for example).

Signs & symptoms: Symptoms can arise about two days to four weeks after exposure to the bacteria.

• Anicteric phase

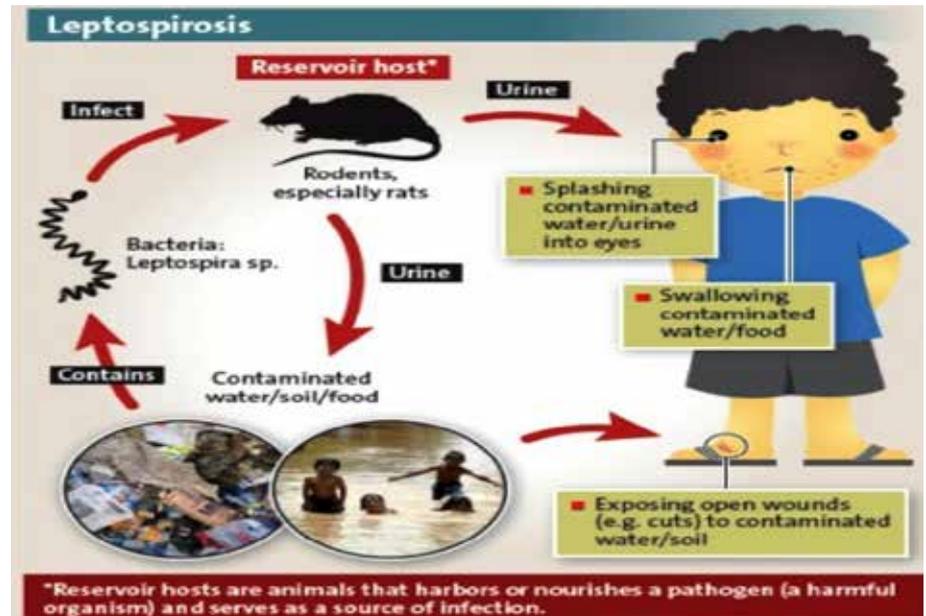
• Icteric phase

Anicteric phase: Mild form of Leptospirosis

The first phase, which usually lasts 5 to 7 days, begins suddenly with symptoms High fever (38-40° C)

- chills,
- headache,

TRANSMISSION



- muscle aches,
- abdominal pain,
- nausea and vomiting,
- diarrhea,
- non pruritic rash, and
- conjunctivitis

Icteric: Weil's disease

A second phase of illness (immune phase) may follow 1 to 2 weeks later, with symptoms

- Fever
- Jaundice
- Renal failure
- Haemorrhage
- Pulmonary dysfunction (cough, dyspnea, chest pain, hemoptysis and respiratory failure)
- Hepatic necrosis

DIAGNOSIS:

Health-care professionals may perform definitive tests by isolating the bacteria from the patient (blood or CSF) or by a positive microscopic agglutination test (MAT). Other tests include (ELISA, PCR, urine dipsticks) may provide additional evidence of infection.

Incubation period

(time between becoming infected and developing symptoms)

Usually 10 days, with a range of 2 to 26 days.

Infectious period

(time during which an infected person can infect others)

Infections are the result of contact with the urine of infected animals. Person-to-person transmission does not occur.

Prevention

- Exclusion from childcare, preschool, school or work is not necessary.
- Minimise contact with fresh water, mud and vegetation that might be contaminated with the urine of infected animals, especially rodents. Wear protective clothing, such as waterproof boots or waders, when participating in recreational or work activities that might result in such exposure.
- Vaccinate dairy cows.
- Rodent control is important.
- No vaccine is available for humans.

Treatment:

Leptospirosis is usually treated with a course of antibiotics, although their effectiveness has not been conclusively proven. Most cases of leptospirosis are mild and are treated with a five to seven-day course of antibiotic tablets. Penicillin or a tetracycline antibiotic called doxycycline are the preferred choices. Erythromycin (E. mycin, Eryc, Ery-tab, PCE, pediazole, Ilosone), Amoxicillin (Amoxil, trimox, Moxatag, Larotid).

Dengue

Dengue is a mosquito-borne flavivirus disease that has spread to most tropical and many subtropical areas. Dengue (pronounced DENG-gay) can affect anyone but tends to be more severe in people with compromised immune systems. Because it is caused by one of five serotypes the dengue virus. Dengue goes by other names, including “breakbone fever” or “dandy fever.” Victims of dengue often have contortions due to the intense joint, muscle, and bone pain, hence the name breakbone fever. Slaves in the West Indies who contracted dengue were said to have dandy fever because of their postures and gait.

Transmission:

The virus is contracted from the bite of a striped *Aedes aegypti* mosquito that has previously bitten an infected person.

Sign and symptoms:

The incubation period ranges from 3 to 15 days.

Dengue starts with chills, headache, pain upon moving the eyes, appetite loss, feeling unwell, low backache.

Painful aching in the legs and joints occurs during the first hours of illness.

The temperature rises quickly as high as 104 F (40 C), with relatively low heart rate (bradycardia) and low blood pressure (hypotension).

The eyes become reddened. A flushing or pale pink rash comes over the face and then disappears.

The lymph nodes in the neck and groin are often swollen.



Progression:

High fever and other signs of dengue last for two to four days, followed by a rapid drop in body temperature with profuse sweating.

This precedes a period with normal temperature and a sense of well-being that lasts about a day.

A second rapid rise in temperature follows. A characteristic itchy rash appears along with the fever and spreads from the extremities to cover the entire body except the face. The palms and soles may be bright red and swollen

Diagnosis:

DENV Detect IgM Capture ELISA test is done to detect Dengue

Treatment:

The treatment is concerned with symptomatic relief only. Rest and fluid intake for hydration is important. Acetaminophen (Tylenol) and codeine may be given for severe headache and for joint and muscle pain (myalgia). Pain relievers such as anti-inflammatory drugs (NSAIDs) should only be taken under a doctor's supervision because of the possibility of worsening bleeding complications

Vaccination:

The first dengue vaccine, Deng-

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vaxia (CYD-TDV) by Sanofi Pasteur, was first registered in Mexico in December, 2015. CYD-TDV is a live recombinant tetravalent dengue vaccine that has been evaluated as a 3-dose series on a 0/6/12 month schedule in Phase III clinical studies. It has been registered for use in individuals 9-45 years of age living in endemic areas.

Dengue Hemorrhagic Fever (DHF)

Dengue hemorrhagic fever (DHF) is a specific syndrome that tends to affect children under 10 years of age. This complication of dengue fever causes abdominal pain, hemorrhage and circulatory collapse.

Prevention of dengue fever:

Patients are kept under mosquito netting until the second cycle of fever is over and they are no longer able to transmit the virus to a biting mosquito.

Empty stagnant water from old tires, trash cans, and flower pots

To prevent mosquito bites, wear long pants and long sleeves.

For personal protection, use mosquito repellent sprays that contain DEET when visiting places where dengue is endemic.

staying indoors for two hours after sunrise and before sunset will help, as the *Aedes aegypti* mosquito is a daytime biter with peak periods of biting around sunrise and sunset.

Information on dengue fever:

- o “Dengue,” Centers for Disease Control and Prevention.
- o <http://www.cdc.gov/Dengue/>
- o Medicine net.com

Medical Awareness Camp At VHS

The Pharm D students conducted a medical awareness camp on 25th January 2016 at VHS. The patients were educated on various diseases like Diabetes, Asthma, Dengue,

Leptospirosis, Malaria, Tuberculosis and prevention of cancer. The blood glucose, BP and BMI of the patients were monitored. They were educated on obesity and management of diabetes.

Top 5 Water Borne Related Diseases In India

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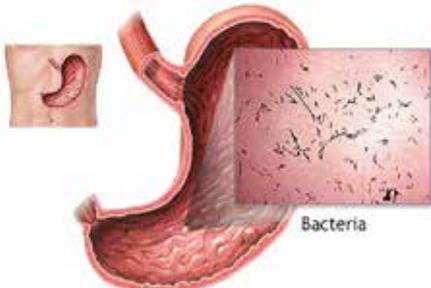
Department of Pharmacy Practice

Water related diseases are the most common cause of



deaths. The paucity of clean water for domestic use has led to the increase in the number of deaths in both the urban and rural parts of developing economies. And India is no different. Deaths due to water related diseases in India are in the range of nearly 80 percent. About 20 per cent of the communicable diseases in India are waterborne. Poor sanitation, improper storage of water and lack of proper waste disposal are the main causes of water contamination. Here is a list of the 5 most deadly water related diseases that occur in India.

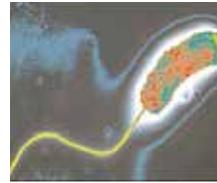
DIARRHOEA



- Diarrhoea remains the most prevalent water related disease in India.
- It mostly affects children under the age of 5 and often leads to death.
- Diarrhoeal infection is spread through food and drinking water that has been contaminated.
- A diarrhoeal attack can last up to 2 weeks and leave the person completely dehydrated.
- Symptoms of diarrhoea include, severe dizziness, loss of consciousness, dehydration and pale skin, little or no urination and in some case bloody stool.
- Diarrhoea can spread through multiple viruses that is found in contaminated water. The poorer sections of the society come in daily contact with this water and that is the why the rate of diarrhoea is highest amongst them.

CHOLERA

- Thousands of people fall prey to cholera every year in India.
- Cholera is a water related disease, and is diarrhoeal in nature.
- It can kill in hours if left unattended.
- Cholera strikes when one ingests water that is infested with the *Vibrio Cholerae* bacterium.
- Symptoms of cholera include watery bowels and fever in certain cases.
- Cholera can happen to both children and adults.
- In India cholera related deaths are most common in places with shortage of good quality water.



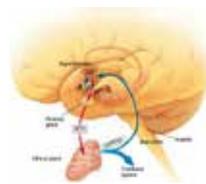
MALARIA

- Malaria or Malarial fever is spread by the *Plasmodium* parasite mosquito that breeds in water bodies like lakes and paddy fish.
- Stagnant water is another favourite breeding ground for these deadly parasites.
- Malaria mostly kills children in India, as adults slowly form some sort of immunity against the parasite, over the years.
- Malarial fever symptoms include fevers, chills, headaches and vomiting. Sometimes these symptoms are also coupled with anaemia.
- A malarial infection shows only after a week has passed. Therefore, treating it immediately is a necessity.



JAPANESE ENCEPHALITIS

- Japanese encephalitis is a water related disease that is caused by the *Culex Tritaeniorhynchus* and *Culex Vishnui* type of mosquitoes.
- These mosquitoes' favourite breed-



ing ground is water flooded paddy fields.

- Therefore, Japanese encephalitis is majorly found in the agricultural regions of India.
- The Japanese encephalitis virus attacks children the most and in some cases this water related disease can lead to death.
- The symptoms of Japanese encephalitis include fever, vomiting, headaches and in acute cases, coma, seizures and finally death.
- The vaccine for Japanese encephalitis is very expensive therefore most of the economically backward families in India cannot afford it.

FILARIASIS

- Filariasis is a parasitic disease and affects people who live near unsanitary water bodies or sewages.
- Filariasis is spread by mosquitoes that breeds in fresh and stagnant water bodies and is the host of the filarial nematode worm. This worm affects humans and leads to elephantitis.
- Filariasis can lead to blindness, and rapid skin pigmentation and the filarial worms can affect various parts of the body.
- Filariasis is a concern for the rural population in India whose major occupation is agriculture.
- Although Filariasis can be treated and prevented with oral medicines, lack of medicines in rural India leads to severe disfiguration in many cases.



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2. Waterborne disease. [Internet]. Available from: http://khanhera-wbd.hpage.co.in/water-related-diseases_14747643.html

Japanese Encephalitis

Japanese encephalitis virus JEV is the most important cause of viral encephalitis in Asia. It is a mosquito-borne flavivirus, and belongs to the same genus as dengue, yellow fever and West Nile viruses. The first case of Japanese encephalitis viral disease (JE) was documented in 1871 in Japan. JE primarily affects children. Most adults in endemic countries have natural immunity after childhood infection, but individuals of any age may be affected.

Signs and symptoms

Most JEV infections are mild (fever and headache) or without apparent symptoms. Severe disease is characterized by rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and ultimately death. The case-fatality rate can be as high as 30% among those with disease symptoms. Of those who survive, 20%–30% suffer permanent intellectual, behavioral or neurological problems such as paralysis, recurrent seizures or the inability to speak.

Transmission

JEV is transmitted to humans through bites from infected mosquitoes of the *Culex* species (mainly *Culex tritaeniorhynchus*). Humans, once infected, do not develop sufficient viraemia to infect feeding mosquitoes. The virus exists in a transmission cycle between mosquitoes, pigs and/or water birds (enzootic cycle).

Diagnosis

Surveillance of the disease is mostly syndromic for acute encephalitis. Confirmatory laboratory testing is often conducted in dedicated sentinel sites, and efforts are undertaken to expand laboratory-based surveillance. Case-based surveillance is established in countries that effectively control JE through vaccination.

Treatment

There is no antiviral treatment for patients with JE. Treatment is supportive to relieve symptoms and stabilize the patient.

Prevention and control

Safe and effective JE vaccines are available to prevent disease.

Prevalence in Asia and India



WHO recommends having strong JE prevention and control activities, including JE immunization in all regions where the disease is a recognized public health priority, along with strengthening surveillance and reporting mechanisms. Even if the number of JE-confirmed cases is low, vaccination should be considered where there is a suitable environment for JE virus transmission. There is little evidence to support a reduction in JE disease burden from interventions other than the vaccination of humans.

There are 4 main types of JE vaccines currently in use: inactivated mouse brain-derived vaccines, inactivated Vero cell-derived vaccines, live attenuated vaccines, and live recombinant vaccines.

Vaccine development

Challenge protocol

Challenge of mice with intraperitoneal virus followed by intracerebral inoculation of 1% starch has been studied as challenge protocol to determine the efficacy of vaccine. This takes into account the role of CMI response in addition to antibody response in protection.

Attenuated vaccine

Partial attenuation of JE virus was obtained by passages in chick embryo culture. However, no table attenuated strain could be obtained.

One attenuated ts mutant obtained from persistently infected cells showed loss of virulence at

passage level of 20 by the i.p. route. This mutant could protect mice against challenge with 2.5 logs of virus and thus has the potential to be developed as an attenuated vaccine.

Tissue culture vaccine

A chick embryo culture derived inactivated unpurified vaccine candidate was protective in mice.

Peptide vaccine

Using chimeric peptides incorporating sequences of T helper and B cell epitopes, N. antibody induction and partial protection of mice from lethal challenge with JE virus has been demonstrated. Studies on increasing the protective ability of these chimeric peptides expression vector to develop candidate DNA vaccine. The recombinant plasmids expressed antigen in transfected cells. Mice immunized with recombinant plasmid showed the presence of neutralizing antibodies.

DNA vaccine

The precursor M-envelope (truncated) and Ns1 genes were cloned into a mammalian using antigen delivery systems and adjuvant are planned. These chimeric peptide epitopes are being used for development of polytope DNA vaccine.

References:

1. <http://www.who.int/mediacentre/factsheets/fs386/en/>
2. <http://www.icmr.nic.in/pinstitute/niv/JAPANESE%20ENCEPHALITIS.pdf>

Viral Gastroenteritis

What is viral gastroenteritis?

Gastroenteritis means inflammation of the stomach and small and large intestines. Viral gastroenteritis is an infection caused by a variety of viruses those results in vomiting or diarrhea. It is often called the “stomach flu,” although it is not caused by the influenza viruses

Causes

Viral gastroenteritis is a leading cause of severe diarrhea in both adults and children. Many types of viruses can cause gastroenteritis. The most common ones are

1. Astrovirus
2. Enteric adenovirus
3. Norovirus (also called Norwalk-like virus). It is common among school-age children.
4. Rotavirus, the leading cause of severe gastroenteritis in children. It can also infect adults exposed to children with the virus. Outbreaks may also occur in nursing homes.

Rotavirus

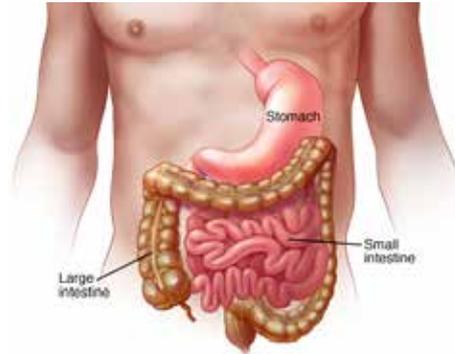
Rotavirus is the leading cause of gastroenteritis among infants and young children. Rotavirus infections are most common in infants 3 to 15 months old. Symptoms usually appear 1 to 3 days after exposure. Rotavirus typically causes vomiting and watery diarrhea for 3 to 7 days, along with fever and abdominal pain. Rotavirus can also infect adults who are in close contact with infected

Caliciviruses

Caliciviruses and the most common cause of viral gastroenteritis in adults. Norovirus is usually responsible for epidemics of viral gastroenteritis. Norovirus outbreaks occur all year but are more frequent from October to April. People infected with norovirus typically experience nausea, vomiting, diarrhea, abdominal cramps, and fatigue, headache, and muscle aches. The symptoms usually appear 1 to 2 days after exposure to the virus and last for 1 to 3 days.

Adenovirus

Adenovirus mainly infects children younger than 2 years old. Of the 49 types of adenoviruses, one



strain affects the gastrointestinal tract, causing vomiting and diarrhea. Symptoms typically appear 8 to 10 days after exposure and last 5 to 12 days. Adenovirus infections occur year-round.

Astrovirus

Astrovirus primarily infects infants and young children, but adults may also be infected. This virus causes vomiting and watery diarrhea. Symptoms usually appear 3 to 4 days after exposure and last 2 to 7 days. The symptoms are milder than the symptoms of norovirus or rotavirus infections.

Other symptoms may include:

Chills, Clammy skin, Excessive sweating, fever, joint stiffness, Leakage (incontinence) of stool, Muscle pain, poor feeding, Vomiting blood (very rare), and Weight loss.

How is viral gastroenteritis spread?

Norovirus is extremely contagious and is primarily spread when microscopic viral particles are transferred from contaminated hands to the mouth and ingested (fecal-oral). Excretion of virus in the stool begins a few hours before the onset of symptoms and reaches a maximum 24–72 hours after exposure.

Persons who have been exposed but do not develop symptoms may also transmit the virus. Vomiting will also disperse viral particles through the air, resulting in exposure of persons nearby and in contamination of environmental surfaces and objects.

Norovirus can also be transmitted by food and water.

How is viral gastroenteritis diagnosed?

Viral gastroenteritis cannot be diagnosed by traditional stool cultures (for bacteria) or examination

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of stool for ova and parasites. Norovirus can be identified by polymerase chain reaction (PCR-The polymerase chain reaction (PCR) is a technology in molecular biology used to amplify a single copy or a few copies of a piece of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence.)

Treatment

1. The goal of treatment is to prevent dehydration.
2. Fluids and electrolytes (salt and minerals) lost through diarrhea or vomiting must be replaced by drinking extra fluids.
3. Use the electrolyte and fluid replacement solutions or freezer pops available in food and drug stores.
4. Breast milk or formula can be continued along with extra fluids. You do NOT need to switch to a soy formula.

Most cases of viral gastroenteritis resolve over time without specific treatment. Antibiotics are not effective against viral infections. The primary goal of treatment is to reduce symptoms and prevent complication.

Prevention

Most infectious organisms are transmitted by unwashed hands. The best way to prevent viral gastroenteritis is to handle food properly and wash hands thoroughly after using the toilet.

Vaccination to prevent severe rotavirus infection is recommended for infants starting at age 2 months.

Reference

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- CDC. Nor virus in ealthcareFacilities.http://www.cdc.gov/ncidod/dhqp/id_norovirusFS.html.
- Maryland Department of Health & Mental Hygiene Epidemiology & Disease Control Program s March 2009
- Southern Nevada health district-Parasu information
- Franciscan Health Library at www.FHSHealth.org/Health_Education.aspx

National Conference of Pharmacoepidemiology and Good Clinical Pharmacy Practice

The conference was organized by Department of Pharmacy Practice, on 4th and 5th September, 2015 at Hotel Fortune Select Palm, Thoraipakkam, Chennai.

The conference was inaugurated by Dr. Sarkar, Director, V.H.S Hospital and Dr. Hena Mirza, Medical Superintendent, Malar Hospital, Adyar, Chennai. The major topic covered on the first day conference included

1. Drug utilization research & Good clinical pharmacy practice by Dr. M. Surulivel Rajan, Assistant Professor, College of Pharmacy, Manipal University,
2. Drug testing methods, importance and need in India by Dr. S. Saravanan Perumal, Senior Scientific Officer, Ministry of Sports Medicine, Government of India, New Delhi.
3. Dr. Sujith J Chandy, Professor & Head, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla covered "Pharmacoepidemiology methods, current status and future perspectives".
4. D. Prabakaran, Ph.D | Associate Vice President – Pharmacokinetics Par Biosciences Pvt. Ltd, Chennai gave a talk on "Bioequivalence and Bioavailability studies need in India".
5. The end session was covered by Dr. M. Sudaroli, Subject Matter Expert, iMED Global, Bangalore on



Inauguration of the conference

Safety reporting in Pharmacovigilance - an Industrial experience.

The second day sessions were started at 9.30 AM,

1. The first eminent speaker on the second day was Dr. Chakradhara Rao S Uppugunduri, Research Fellow and Assistant Teaching Faculty, Department of Pediatric Haematology and Oncology, University Hospitals of Geneva, Geneva, Switzerland. He gave an extensive talk and great insight on "Drug induced liver injury and risk managements".
2. The second session was covered by Dr. Sandhya Selvarajan, Assistant Professor, Department of Clinical Pharmacology, JIPMER, Pondicherry. She spoke on "Evidence Based Medicine".
3. The morning session was end by

the final talk given by Prof. A. Vijayakumar, In-charge, Department of Pharmacy Practice, K.M.C.H College of Pharmacy, Coimbatore on "Meta-analysis".

Scientific paper presentation was during the afternoon session and the evaluators were Dr. Priya, Scientist, V.H.S Hospital & Mr Raghunath, Quality Manager, iMED Global, Bangalore.



Prize winners of the scientific poster presentation.

Medical Camp Conducted in C.L.Baid Metha College of Pharmacy

After the deluge of the floods which ravaged the city in December, the college arranged a free medical camp on 14.12.2015 in association with Rajasthan Health Foundation to screen the people for various ailments. More than 150 people from the neighborhood attended the camp and medicines were distributed free of charge. Blood pressure, blood glucose and BMI were monitored by Pharm.D students



Pharmacy Practice Module, Advance Learning-Series-4 on Infectious Diseases

organized by Indian Association of Colleges of Pharmacy and Vinayaka Missions University, Salem
The module was attended by our staffs and third year Pharm.D students.



Staff and students with Dr.B.Suresh, President P.C.I during the Pharmacy Practice Module-Advanced Learning Series at Salem.

World Pharmacist Day

World Pharmacist Day was celebrated on 25th September 2015. The students took out a rally on the busy OMR road and distributed drug related information as pamphlets. The celebrations concluded with a talk by Mr.T.Sathish, General Manager, Corporate services, Tablets (India) Ltd, Chennai.



Students enacting a mime during the World Pharmacist Day celebration.



Students taking part in the rally on the occasion of World Pharmacist Day.

For details and feedback contact:
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