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Sunidhi Mishra
Research Scholar at
Sahara Hospital, Lucknow,
Uttar Pradesh, India

Kiran Agrahari
Assistant professor at
K.N.I.P.S.S. Sultanpur,
Uttar Pradesh, India

Dharti K Shah
Chief Dietician, Sahara Hospital,
Lucknow, Uttar Pradesh, India

Correspondence
Sunidhi Mishra
Research Scholar at
Sahara Hospital, Lucknow,
Uttar Pradesh, India

Prevention and control of dengue by diet therapy

Sunidhi Mishra, Kiran Agrahari and Dharti K Shah

Abstract

Dengue infection is one of the most common mosquito-borne infections caused by Flaviviridae. Electrolyte disturbances take place in dengue infection. Dengue viral infection led to acute neuromuscular weakness due to hypokalemia. During dengue fever along with other infectious disorders, cause of hypokalemia is inadequate dietary intake and breakdown of tissues releases Potassium into the extra cellular Compartment. The aim of the study was to prevent and control the Dengue by diet therapy. In this study 300 patients of dengue were selected from Sahara Hospital, (Lucknow, U.P.) India. So all the patients treated with diet therapy along with medicine. The basic diet principle were high protein, more and frequent liquids, non-oily non-spicy and soft food items which were easy to digestible. Coconut water, juices, soups and lemon water were given to the patients which were rich in vitamins (B complex, K, C.), minerals (manganese, potassium, iron) and also phytonutrients which were helpful in maintain the electrolyte balance and RBC count. Very soft food items were given in the diet like vegetable poha, vegetable Upma, vegetable sewai, porridges, paneer sandwich with fruits. Khichdi (combination of rice and pulses), green leafy vegetables, paneer vegetable with curd. It was found that patients increase the appetite and maintained the nutritional status.

Keywords: Flaviride, electrolyte disturbance, hypokalemia, diet therapy

1. Introduction

Dengue is an acute viral infection with potential fatal complications. Dengue fever was first referred as “water poison” associated with flying insects in a Chinese medical encyclopedia in 992 from the Jin Dynasty (265-420 AD). The word “dengue” is derived from the Swahili phrase Ka-dinga pepo, meaning “cramp-like seizure”.

Dengue viruses (DV) belong to family *Flaviviridae* and there are four serotypes of the virus referred to as DV-1, DV-2, DV-3 and DV-4. DV is a positive-stranded encapsulated RNA virus and is composed of three structural protein genes, which encode the nucleocapsid or core (C) protein, a membrane-associated (M) protein, an enveloped (E) glycoprotein and seven non-structural (NS) proteins. It is transmitted mainly by *Aedes aegypti* mosquito and also by *Ae. albopictus*. All four serotypes can cause the full spectrum of disease from a subclinical infection to a mild self-limiting disease, the dengue fever (DF) and a severe disease that may be fatal, the dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS) [1, 2].

2.1 History

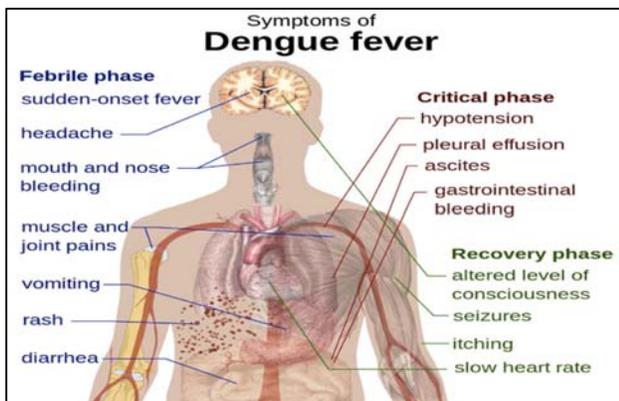
Dengue virus was isolated in Japan in 1943 by inoculation of serum of patients in suckling mice³ and at Calcutta (now Kolkata) in 1944 from serum samples of US soldiers [4]. The first epidemic of clinical dengue-like illness was recorded in Madras (now Chennai) in 1780 and the first virologically proved epidemic of DF in India occurred in Calcutta and Eastern Coast of India in 1963-1964 [5-7]. The first major epidemic of the DHF occurred in 1953-1954 in Philippines followed by a quick global spread of epidemics of DF/DHF [8]. DHF was occurring in the adjoining countries but it was absent in India for unknown reasons as all the risk factors were present. The DHF started simmering in various parts of India since 1988 [9-11]. The first major wide spread epidemics of DHF/DSS occurred in India in 1996 involving areas around Delhi [12] and Lucknow [13] and then it spread to all over the country [14]

2.2 According to the World Health Organization (Who)

- Approximately 2.5 billion people, or two-fifths of the world's population, are now at risk from dengue.

- The disease is now endemic in over 100 countries.
- Dengue hemorrhagic fever is a leading cause of serious illness and death among children in some Asian countries.
- In 2007, there were over 890,000 reported cases of dengue in the Americas, of which 26,000 cases were DHF.
- Dengue infection rates among people who have not been previously exposed to the virus are commonly 40% to 50% during epidemics, but may sometimes reach 80% to 90%.
- Approximately half-a-million people with DHF are hospitalized each year, of which many are children. About 2.5% of these patients die.
- DHF fatality reads may exceed 20% if untreated. If there is access to medical care with health care professionals trained in treating DHF, the death rate may be less than 1%.

2.3 Symptoms



2.4 Causes of Dengue Fever

There are four dengue viruses (DENV) that cause dengue fever, all of which are spread by a species of mosquito known as the *Aedes aegypti* mosquito, and more rarely by the *Aedes albopictus* mosquito. *Aedes aegypti* originated in Africa, but nowadays is found in all the tropical areas around the world and prospers in and close to areas of human population. The virus is transmitted from an infected mosquito to human. The process begins when a mosquito bites a person who is infected with the dengue virus; the virus is then passed on when the infected mosquito then bites someone else.

2.5 Diagnosis of Dengue Fever

The signs and symptoms of dengue fever are similar to some other diseases, such as typhoid fever or malaria, which can sometimes complicate the chances of a prompt and accurate diagnosis. In order for a doctor to properly diagnose dengue fever they will:

1. Assess the symptoms - the doctor will take into account all your symptoms to properly diagnose whether you have dengue. Some tests may be ordered to determine whether it is a dengue infection, or some other.
2. Blood sample - this sample can be tested in a laboratory in a number of ways to find signs of the dengue virus. If the dengue virus is detected diagnosis is straightforward; if this fails there are other blood tests which can identify

antibodies, antigens and nucleic acids, including:

- ELISA (enzyme-linked immune sorbent assay)
 - HI assay (hem agglutination inhibition assay)
 - RT-PCR (reverse transcriptase-polymerase chain reaction)
3. Assess your medical history - The doctor will need to know your travel history and medical history, especially if it involves mosquito exposure.

2.6 Diet Therapy

Diet therapy is a method of eating prescribed by a physician to improve health. A number of conditions are treated in part with therapeutic diets. Treatments involve including foods that improve specific health conditions, while avoiding foods that may make the condition worse. Some health conditions require temporary therapeutic diets. Other times a therapeutic diet may become a permanent change necessary to keep the person healthy. Medical doctors or dietitians normally formulate therapeutic diets. The diet may change over time based on the person's response and improvement in health status^[24]

The term "diet therapy" refers to the usage of food and nutrition in controlling symptoms and creating the best possible life for you through health and wellness. Some illnesses can be effectively managed by altering your diet, and diet therapy is sometimes used before surgery to ensure that surgery is absolutely necessary. If your doctor has suggested diet therapy as a means for wellness, consider the basic principles of diet therapy so you know what questions to ask and what to expect.

Symptom Control

When you're suffering from an illness brought on by a poor diet, your doctor may suggest diet therapy before considering medical treatment, prescription drugs or surgery. Certain conditions such as heart disease can be managed more effectively when diet is under control. As the American Heart Association points out, a healthy diet is one of the best ways to reduce heart problems and lead a healthier lifestyle. Your doctor may even suggest diet therapy simply because he notices you have precursors or red flags for heart disease, even if you aren't currently diagnosed.

Diet Modification

When you indulge in unhealthy eating habits, like choosing fatty foods, eating too many sweets or avoiding vegetables, you put yourself at risk for serious health problems, notes Sumati R. Mudambi in the book, "Fundamentals of Foods, Nutrition and Diet Therapy." After assessing your diet and risk, your doctor may suggest a modified diet to help prevent further problems from occurring. It's important that if you receive this type of advice from your doctor, you follow through as you would a prescription medication. Changes to your diet can take place in small and simple ways; yet add up to make a big difference to your health.

2.7 Types of Diet

- Liquid diet
- Soft diet
- Normal diet

Liquid diet- In liquid diet liquid is given to the patients like coconut water, juices, soups and lemon water. For the dengue

patients these liquids are very healthy because these are rich in vitamins, minerals etc.

Soft diet- Soft diets transition patients from a liquid diet to a regular diet. In the soft diet very soft food items are given which are easy to chew and easy to digestible. The entire food items very well cooked and easy to swallow.

Normal diet- In the normal diet patients can take properly food. It can be called house diet. Normal diet very person to person. It's depended on the individual requirements and specification like for pregnant women's need of more calorie, protein, fat and many other nutrients.

3. Objective

- To prevent the Dengue by diet therapy along with medicine
- To improve the nutritional status of Dengue patients

4. Methods and Materials

Scientific methodology is necessary for a successful study as it directly indicates words the authenticity of the research and attempt has been made to provide the detail of techniques employed to attain this objective of a present investigation. Methodology includes techniques; devices and procedure applied for conducting the research, in this study, the respect concerning the research methodology has been categorized in the following.

4.1 Research Design

Simple random sampling was taken for sampling.

Time	Menu
Early Morning	Milk tea/ lemon tea/ milk + Marigold Biscuit 4 pieces
Breakfast	Vegetable Poha/ vegetable Upma/ plain idli/ vegetable sewai/ porridge/ boiled egg without yolk/ grilled paneer sandwich + Fruits (Apple, Banana, Orange, Pomegranate, Papaya, Kiwi) + Milk
Mid Morning	Coconut Water/ juices (apple, orange, pomegranate, mix)/ soups (spinach beetroot tomato, tomato)/ lemon water
Lunch	Khichdi (combination of rice and pulses well-cooked)/ green leafy vegetables/ paneer vegetal + curd
Evening Tea	Milk tea/ lemon tea/ milk + Marigold Biscuit 4 pieces
Evening Soup	Coconut Water/ juices (apple, orange, pomegranate, mix)/ soups (spinach beetroot tomato, tomato)/ lemon water/ fruits
Dinner	Khichdi (combination of rice and pulses well-cooked)/ green leafy vegetables/ paneer vegetal + curd
Bed Time	Milk

- All the food items were non oily non-spicy
- In the menu also consider the patients preferences

5. Results and Discussion

The empirical result & discussion have been presented the purpose of convenience. The collected data were categorized, analyzed, tabulated & interpreted as per objective of the study.

Table 1: Distribution of patients on the basis of age groups

Age (years)	Frequency (n=100)	Percentage (%)
1-14	75	25
15-29	95	31.6
30-59	90	30
60 above	40	13.3

4.2 Selection of Area: Sahara Hospital, Lucknow, U.P.

4.3 Selection of Sample Size: Total 300 Dengue patient was selected for the study.

4.4 Method of Study

A statistical figures in dispensable for scientific work in this study was primarily based on the biochemical data collection and well developed scheduled to make each interview as comprehensive as possible. The open ended questionnaire in which rigid ticking of respondent every opportunity to speak in a natural and uninhibited way.

4.5 Analysis of Data

The data will be analyzed using talk mark method the finding have been presented form of labels tabulation of data will be make comparison of each attribute in the different attributes study each group in the table express in term of frequency & percentage. The selected samples would be interviewed personally.

4.6 Statistical Analysis

$N (%) = \frac{\text{Number of patient}}{\text{Total number of patients}} \times 100(%) = N = T.N.$

4.7 Sample Menu of Dengue Patients

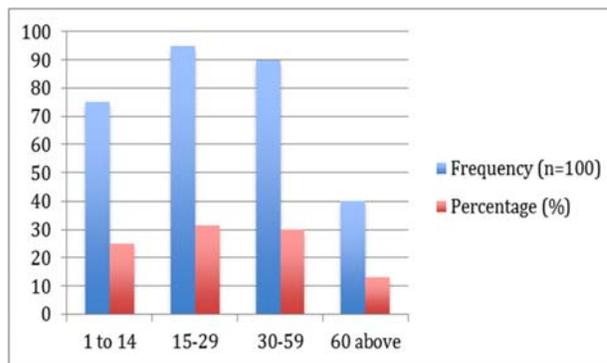


Fig 1: shows that patients were belonging to different age groups 25% were 1 to 14 years, 31.6% were 15 to 29 years, 30% were 30 to 59 years and 13.3% were above the 60.

Table 2: Distribution of patients on the basis of gender groups-

Gender	Frequency (n=100)	Percentage (%)
Children	65	21.6
Male	135	45
Female	100	33.3

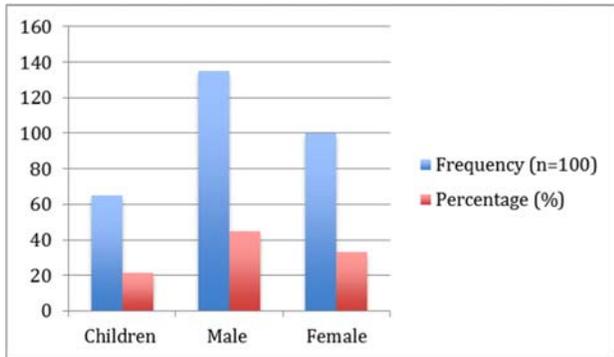


Fig 2: shows that the dengue patients were selected for the study in which 21.6% are children's, 45% were male and 33.3% were females.

Table 3: Distribution of patients on the basis of family type-

Family Type	Yes	No
Joint	95	31.6
Nuclear	205	68.3

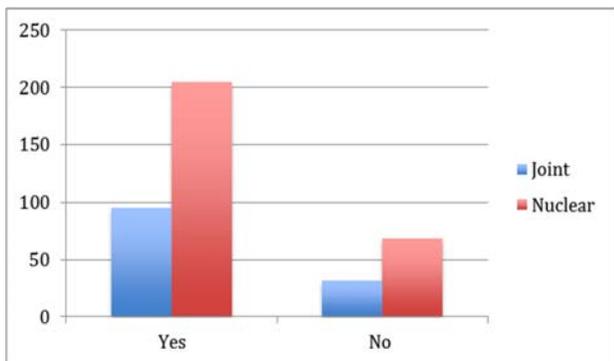


Fig 3: shows that the dengue patient were 68.3% were belonging to nuclear family and 31.6% were belonging to joint family.

Table 4: Distribution of the patients on the basis of fever

Fever	Frequency (n=100)	Percentage (%)
Yes	280	93.3
No	20	6.6

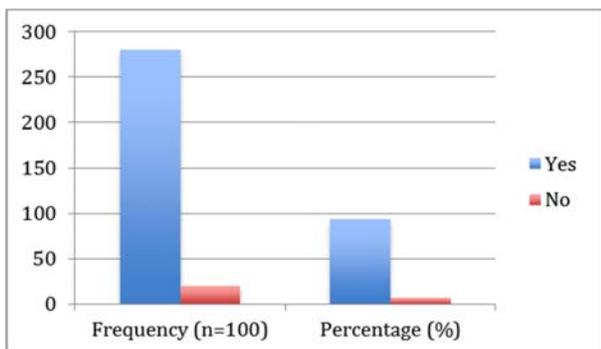


Fig 4: shows that 93.3% patients were suffering from fever during dengue and 6.6% patients had not fever.

Table 5: Distribution of the patients on the basis of vomiting and nausea

Vomiting & Nausea	Frequency (n=100)	Percentage (%)
Yes	240	80
No	60	20

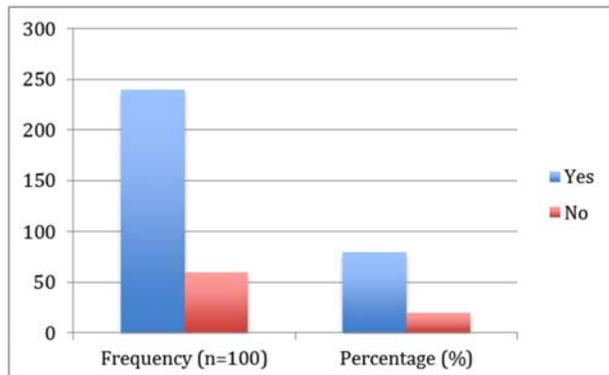


Fig 5: shows that during dengue 80% patient were suffering from vomiting and nausea and 20% patients were not vomiting and nausea.

Table 6: Distribution of patients on the basis of electrolytes imbalance-

Electrolyte imbalance	Frequency (n=100)	Percentage (%)
Yes	300	100
No	00	00

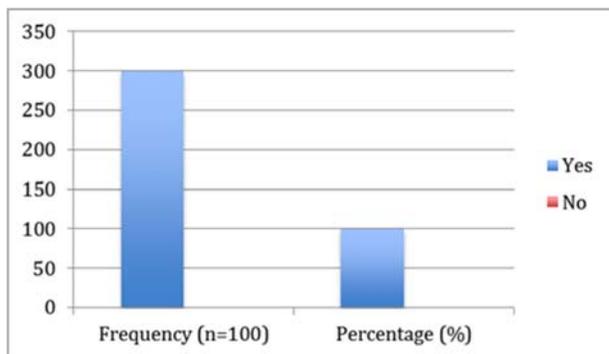


Fig 6: shows that all the patients (100%) have electrolytes imbalance during dengue.

Table 7: Distribution of patients on the basis of intervene of liquids

Intervene of liquids (coconut water, juices, soups, lemon water)	Frequency (n=100)	Percentage (%)
Yes	300	100
No	00	00

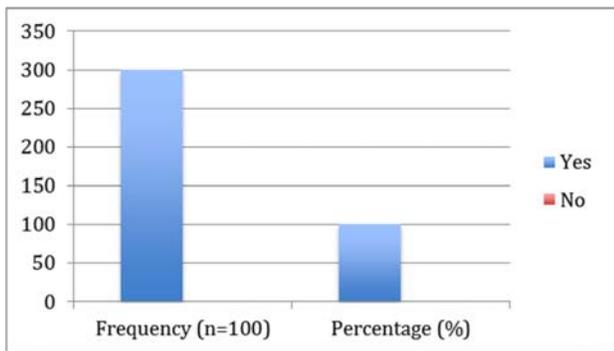


Fig 7: shows that all the (100%) intervene with liquids.

Table 8: Distribution of patients on the basis of electrolytes balance after taking the liquids

Electrolyte balance	Frequency (n=100)	Percentage (%)
Yes	280	80
No	20	20

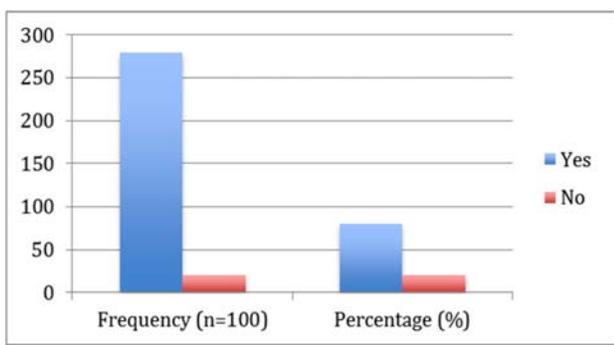


Fig 8: shows that after taking the liquids 80% patients have balanced electrolytes and 20% were not.

In liquids coconut water, juices (apple, pomegranate, orange, mix), soups (spinach beetroot tomato soup, tomato soup), lemon water given to the patients and it was analyzed that after taking these liquids patients electrolytes are balanced. Coconut water rich in Potassium, vitamins and many other nutrients. Lemon is the very good source of vitamin C so lemon water was very helpful in detoxifying the body. Beetroot contains a very high amount of water, vitamin (B9, Vitamin C), minerals (manganese, potassium, iron) these were very helpful in increasing the RBC count. Spinach is rich in vitamin K, potassium and iron. It is also rich in phytonutrients like carotene B and Lutein zeaxanthin etc. tomato is also rich in vitamin C and potassium. Therefore these all are very helpful in maintaining the electrolyte balance, maintain RBC count and detoxifying the body.

Table 9: Distribution of patients on the basis of improved nutritional status

Improved nutritional status	Frequency (n=100)	Percentage (%)
Yes	244	81.3
No	56	18.6

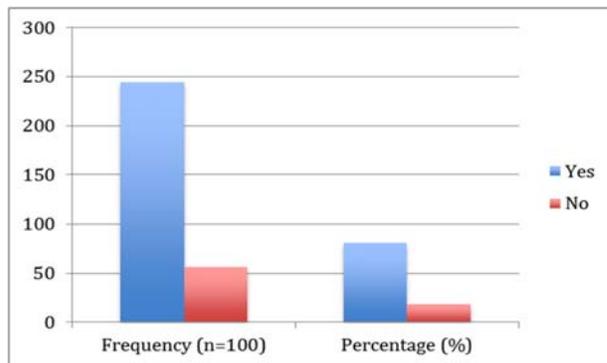


Table 9: Shows that the patients (81.3%) who were intervene with liquids and diet will be increase appetite and maintain the good nutritional status and 18.6% patients were not increased their appetite and nutritional status.

In the diet very soft items provided to the patients in the breakfast, lunch and dinner, which were easy to digestible. Khichdi (combination of rice and pulses), green leafy vegetables, paneer veg along with curd given to the patients. These were very light food and gradually patients increase their appetite.

Eat foods, which can be easily digested. Patient's diet can include boiled vegetables, rice gruel, porridge, soup, toast, apples, bananas and tea. Drink plenty of fluids such as oral rehydration solution, fresh juice, soups, and coconut water. This will help to prevent dehydration due to vomiting and high fever. Avoid fried foods and foods with oil, spices and salt. One can use lemon juice or certain herbs to enhance the flavor of their food. According to some experts of Ayurveda, tea made with fever reducing herbs such as ginger and cardamom is helpful. Ayurveda recommends having the juice or the extract of two fresh-crushed papaya leaves. Take this juice daily. It is considered a good home remedy for the treatment of dengue fever [25]

6. Conclusion

A total no of 300 cases were confirmed to have dengue. A self-prepared questionnaire and collected the biochemical parameter report before taking the liquids and diet. Results shows that patients were belonging to different age groups. 15 to 59 years people were majority of dengue patients. Most of the patients were male than female and children. During the dengue patients were suffering from lots of health complications like low nutritional status, disbalance electrolytes and poor dietary intake. After admitted in the hospital, patients were treated with diet therapy along with medicine. Basically a high protein, low fat, non-oily non-spicy, more and frequent liquids and soft given to the patients. In the diet Khichdi (combination of rice and pulses well-cooked)/ green leafy vegetables/ paneer vegetal + curd and in liquids Coconut Water/ juices (apple, orange, pomegranate, mix)/ soups (spinach beetroot tomato, tomato)/ lemon water/ fruits were given to patients. And it was found that after intake of proper diet with liquids patients were maintained better nutritional status, increased appetite and balance electrolytes. At last it will find out that diet therapy is very helpful in recovering from dengue, good nutritional status, increased appetite and increase RBC count and balanced electrolytes.

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