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STUDY OF INCIDENCE OF MALARIA, DENGUE AND CHIKUNGUNYA FEVERS AMONG FEBRILE PATIENTS VISITING TERTIARY CARE HOSPITAL (KING GEORGE HOSPITAL) IN VISAKHAPATNAM

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ABSTRACT

Aim & objective*:** Study of incidence of malaria, Dengue and Chikungunya fevers among febrile patients visiting tertiary care hospital (King George hospital) in Visakhapatnam. ***Method: The study is conducted in-patients visiting King George Hospital, which is a Government General Hospital located in Visakhapatnam, Andhra Pradesh, India. The hospital with 1237 beds serving the needs of north coastal Andhra Pradesh and adjacent Orissa for more than 150 years. Patients presenting to the health centre with some signs and symptoms compatible with the diagnosis of malaria, dengue and chikungunya (fever which can be recent or in evidence during the previous 2-4 days or/and other symptoms of febrile diseases such as chills, headache, joint, muscle and body pains).100 febrile patients shall be selected randomly at the age group of 13-60 years Patients shall also be selected on the basis of febrile and other symptoms such as chills, headache, joint, and muscle and body pains. **Results and Conclusion**: Age wise Distribution of Malaria, Dengue and Chikungunya, number of patients n=100 were taken, total n=72 patients were positive for Malaria, n=24 patients were positive for Dengue and n=4 patients were Chikungunya. With the Mean of 10.6 and Standard Deviation are 6.1. From the age group of "36 to 50"years n=28 number of patients positive for both males and females, form this total n=12 positive for malaria with the percentage of 16.6% and Females were n=16 with the percentage of 22.2%.From the age group "51 to 65"years n=8 number of patients positive for malaria in both males and females, from this total the male patients were n=4 positive for malaria with the percentage of 5.6%.The age wise description of Dengue a total "n=24"number of patients are positive for Dengue in both males and females. From the total n=16 number of male patients which are positive for Dengue with the percentage of 66.6% with the Mean of 5.3 and Standard Deviation is 4.7.females were n=8 number of patients with the percentage of 33.3% and in the Mean of 11.1 with Standard Deviation is 2.4. The age wise description of Chikungunya fever of different age groups a total "n=4"number of patients are positive for Chikungunya fever in both males and females. From the total n=02 number of male patients which are positive for malaria with the percentage of 50% with the Mean of 0.6 and Standard Deviation is 0.5 females were n=02 number of patients with the percentage of 50% and in the Mean of 0.6 and Standard Deviation is 0.5. Chikungunya fever in both males and females, from the total male patients were n=0 positive for Chikungunya fever and females were n=1 number of patients positive for Chikungunya with the percentage of 25%. The maximum peaks are observed equally in the age of 36 to 50 years age group. The Month wise Description of Malaria, Dengue and Chikungunya positive patients from the month of April 2017 to month of October 2017. To identify the seasonal variation of the disease, analysis of the data on monthly basis was done.

INTRODUCTION

Fever is defined as having a temperature above the normal range due to an increase in the body's temperature set-point. There is not a single agreed upon upper limit for normal temperature with sources using values between 37.5 and 38.3 °C (99.5 and 100.9 °F). The increase in set-point triggers increased muscle contractions and causes a feeling of cold. This results in greater heat production and efforts to conserve heat. When the set-point temperature returns to normal, a person feels hot, becomes flushed, and may begin to sweat. Rarely a fever may trigger a febrile seizure. This is more common in young children. Fevers do not typically go higher than 41 to 42 °C (105.8 to 107.6 °F). The pattern of temperature changes may occasionally hint at the diagnosis:

Continuous fever: Temperature remains above normal throughout the day and does not fluctuate more than 1 °C in 24 hours, *e.g.* lobar pneumonia, typhoid, meningitis, urinary tract infection, or typhus. Typhoid fever may show a specific fever pattern (*Wunderlich curve* of typhoid fever), with a slow stepwise increase and a high plateau. (Drops due to fever-reducing drugs are excluded.)

Intermittent fever: The temperature elevation is present only for a certain period, later cycling back to normal,

e.g. Malaria, kala-azar, pyaemia, or septicemia. Following are its types

Quotidian fever, with a periodicity of 24 hours, typical of *Plasmodium falciparum* or *Plasmodium knowlesi* malaria

Tertian fever (48-hour periodicity), typical of *Plasmodium vivax* or *Plasmodium ovale* malaria

Quartan fever (72-hour periodicity), typical of *Plasmodium malariae* malaria.

Remittent fever: Temperature remains above normal throughout the day and fluctuates more than 1 °C in 24 hours, *e.g.*, infective endocarditis, brucellosis.

Pel-Ebstein fever: A specific kind of fever associated with Hodgkin's lymphoma, being high for one week and low for the next week and so on. However, there is some debate as to whether this pattern truly exists.

MALARIA

INTRODUCTION:

Malaria afflicts 36% of the world population i.e. 2020 million in 107 countries (**WHO**) and territories situated in the tropical and subtropical regions. India contributes about 70% of malaria in the South East Asian Region of WHO. Although annually India reports about two million cases and 1000 deaths attributable to malaria, there is an increasing trend in the proportion of *Plasmodium falciparum* as the agent.(A.P.Dash *et al*.,2015) The high burden populations are ethnic tribes living in the forested pockets of the states like Orissa, Jharkhand, Madhya Pradesh, Chhattisgarh and the North Eastern states which contribute bulk of morbidity and mortality due to malaria in the country.

- ❖ Drug resistance, insecticide resistance, lack of knowledge of actual disease burden along with new paradigms of malaria pose a challenge for malaria control in the country.(A.P.Dash *et al*.,2015)

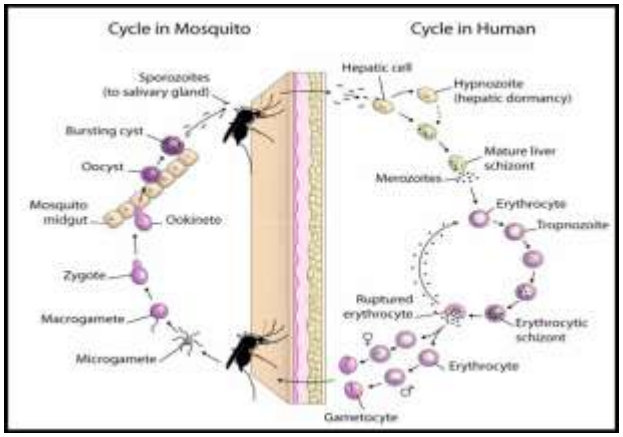
SIGNS AND SYMPTOMS:

Clinical features:-

Running nose, cough and other signs of respiratory infection
Diarrhoea/dysentery
Burning micturition and/or lower abdominal pain
Skin rash/infections
Abscess
Painful swelling of joints
Ear discharge
Lymphadenopathy

DIAGNOSIS:

Three techniques are currently in use for parasitological confirmation of malaria infection:
Blood smear microscopy,
Polymerase chain reaction (PCR), and
Malaria rapid diagnostic tests (RDTs). (Matthew R. Boyce *et al*.,2014)



(Richard Marrow MD MPH., Johns Hopkins University ,Epidemiology And Control Of Malaria, 2015.)

DENGUE

- Dengue is currently one of the most important arboviral diseases, with 2.5 billion people living in areas of risk and many tens of millions of cases occurring each year. (Izabela A. et.al 2010).
- It is one of the most rapidly rising mosquito(*Aedes aegypti*) transmitted infections in the world and has been identified as a re-emerging disease in southeast Asia.(Suzanne Moore Shepherd, MD, MS, DTM&H, FACEP, FAAEM .,2015).
- Dengue has been known in India since 1945, and the classical dengue fever (DF) was mainly associated with febrile illness and joint pains (S. C. Tewari et.al CRME).
- There are four distinct serotypes of dengue virus (DENV) and each of these serotypes can cause disease symptoms ranging from self-limited febrile illness called dengue fever (DF) to dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).

SIGNS AND SYMPTOMS:

Clinical Features:

Dengue Fever is an acute viral disease manifesting with

- Headache
- Retro-orbital pain
- Skin Rash
- Vomiting
- Thrombocytopenia
- High fever
- Hemorrhagic phenomena and Hepatomegaly

The risk factors of severe hemorrhage and subsequent mortality are duration of shock and low-normal hematocrit at the time of shock **(**SK Sharma, Gautam Ahluwalia, New Delhi 2013).

CHIKUNGUNYA

- Chikungunya fever is a viral disease transmitted to humans by the bite of infected *Aedes aegypti* mosquitoes.
- In 'Swahili' language, Chikungunya means that which contorts or bends up or illness of the bended walker.

Till, 11th September, 2016 a total of 14656 clinically suspected cases (including 1724 in Delhi) from 18 states and 2 UT's have been reported. (World Health Organization, Regional Office for South-East Asia., 2016).

SIGNS AND SYMPTOMS:

Clinical Features:

Symptoms generally start 4–7 days after the mosquito bite. The acute phase is characterized by painful polyarthralgia, high fever, asthenia, headache, vomiting, rash and myalgia.(//medlineplus.gov/ency/patientinstructions/000821.htm)

Common

- Fever
- Arthralgia/Arthritis
- Backache
- Headache
- Skin rash/Itching
- Painful joint movement
- Skin pigmentation

METHODOLOGY:

Study area:

The study is conducted in in-patients visiting King George Hospital, which is a Government General Hospital, located in Visakhapatnam, Andhra Pradesh, India. The hospital with 1237 beds serving the needs of north coastal Andhra Pradesh and adjacent Orissa for more than 150 years.

Study Period: April-2017 to October-2017.

Sample Size: n=100

Gender wise distribution of malaria, dengue and chikungunya	
Males	**Females**
52	**48**
Total :100	

Inclusion Criteria

- Patients presenting to the health centre with some signs and symptoms compatible with the diagnosis of malaria, dengue and chikungunya (fever which can be recent or in evidence during the previous 2—4 days or/and other symptoms of febrile diseases such as chills, headache, joint, muscle and body pains).
- 100 febrile patients shall be selected randomly at the age group of 13-60 years
- Patients shall also be selected on the basis of febrile and other symptoms such as chills, headache, joint, and muscle and body pains.
- Based on the advice of the physician the tests will be conducted.

Exclusion Criteria:

- The patients which are

Pregnant and lactating women,

Age below 13 years and

Age above 60 years old patients will not be selected for this study.

Data Collection: Six Months.

Statistical analysis:

Data entry will be performed using Microsoft excel, analysis would be performed using both excel STAT and SPSS.

Institutional Ethics committee (IEC) Approval:

(Regd.No.ECR/197/Inst/KGH/2013/DCGI/20-04-2013)

The ethics committee meeting will be held on 22-April-2017 at1:50pm King George Hospital Visakhapatnam .The chairman and member of the ethical committee have gone through the study material supplied and after detail deliberation the committee accords APPROVED for this study.

Patient Informed Consent Form (ICF) and Subject Profile Form:

A well designed patient consent form will be given to the patients enrolled into the study. The relevant data such as age, sex, occupation, age, alcoholic, smoking, complications, co-infections, medications prescribed and dispensed is recorded.

RESULTS:

Table No.1: Gender wise Distribution Of Malaria, Dengue and Chikungunya

RESULTS:

From the Table No:1 a total n=100 number of patients were taken for the study, out of total **100** patients **52** patients were **Males** and **48** patients were **Females** with the **Mean** of **50** and **Standard Deviation 2.83** ,by the percentage **52%** is regarded as **Male patients** and **48%** is regarded as **Female patients** in the present study.

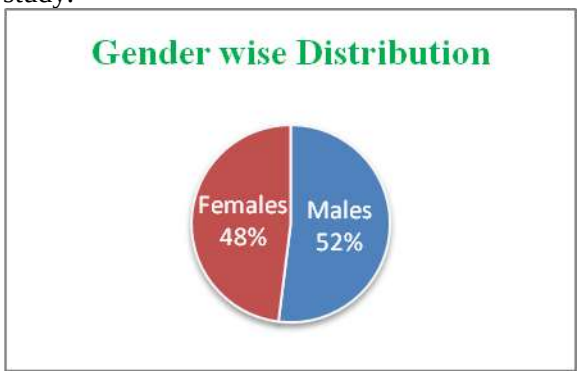


Figure No.1: Gender wise distribution of Malaria, Dengue and Chikungunya

RESULTS:

From the Table No.2 explains the Age wise Distribution of Malaria, Dengue and Chikungunya, From the above table total number of patients **n=100** were taken for the study From this total **n=72** patients were positive for Malaria, **n=24** patients were positive for Dengue and **n=4** patients were Chikungunya.

RESULT:

- From the above **Table No:3** describes the Age wise Distribution of malaria, in this study different age groups are included from the age of **"13 to 35","36 to 50", "50 to 65".** A total **"n=72"**number of patients are positive for malaria in both males and females.

- From the total **n=32** number of male patients which are positive for malaria with the percentage of **44.4%** with the **Mean** of **10.6** and **Standard Deviation** is **6.1**.
- Females were **n=40** numbers of patients with the percentage of **55.5%** and in the Mean of **13.3** with standard deviation is **8.3.**
- From the age group of **"13 to 35"**years **n=36** number of patients positive for both males and females, from this total **n=16** patients are Males with the percentage of **22.2%** and Females were **n=20** with the percentage of **27.7%.**
- From the age group of **"36 to 50"**years **n=28** number of patients positive for both males and females, form this total **n=12** positive for malaria with the percentage of **16.6%** and Females were **n=16** with the percentage of **22.2%.**
- From the age group **"51 to 65"**years **n=8** number of patients positive for malaria in both males and females, form this total the male patients were **n=4** positive for malaria with the percentage of **5.6%** and females were **n=4** number of patients positive for malaria with the percentage of **5.6%**.

From the **Figure No: 2** the bar diagram represent the percentage of both males and females positive for malaria in different age groups. The maximum or highest peaks are observed in female patients with percentage of **55.5%.**

Table No.2 Frequency of Malaria, Dengue and Chikungunya

No. of Patients	Malaria		Dengue		Chikungunya	
	Male	Female	Male	Female	Male	Female
n=100	32	40	16	8	2	2
Total	n=72		n=24		n=04	

Table No.3: Age wise Distribution of Malaria

Age	Malaria(n=72)			
	Male	%	Female	%
13 to 35 (n=36)	16	22.2	20	27.7
36 to 50 (n=28)	12	16.6	16	22.2
51 to 65 (n=8)	4	5.6	4	5.6
Total	32	44.4%	40	55.5%
MEAN S D	10.66 6.11	14.8 12.33	13.33 8.32	18.5 11.50

ODDS RATIO: 1.25, P < 0.4

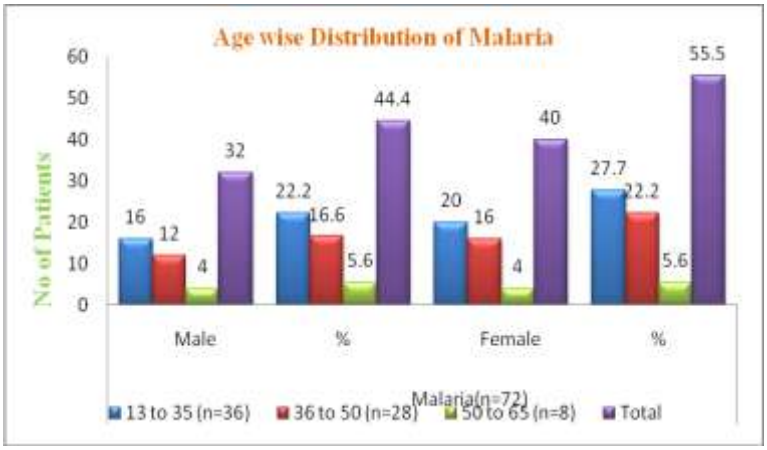


Figure No.2: Age wise Distribution of Malaria

Age wise distribution of Dengue:
Table No.4: Age wise Distribution of Dengue
RESULTS:

Age	Dengue (n=24)			
	Male	**%**	**Female**	**%**
13to 35 (n=10)	7	29.2	3	12.5
36 to 50 (n=11)	9	37.5	3	12.5
50 to 65 (n=2)	0	0	2	8.3
Total	16	66.6	8	33.3
MEAN S D	5.33 4.72	22.23 19.69	2.66 0.57	11.1 2.42

From the above **Table No:4** describes the age wise description of Dengue, in this study different age groups are included from the age of **"13 to 35","36 to 50", "50 to 65".** A total **"n=24"**number of patients are positive for Dengue in both males and females.

- From the total **n=16 number** of male patients which are positive for Dengue with the percentage of **66.6%** with the **Mean** of **5.3** and **Standard Deviation** is **4.7**.females were **n=8** number of patients with the percentage of **33.3%** and in the **Mean** of **11.1** with **Standard Deviation** is **2.4.**
- From the age group of **"13 to 35"**years **n=**10 number of patients positive for both
- Males and females, from the total **n=10** the patients which are **n=07** patients are males with the percentage of **29.2%** and females were **n=03** with the percentage of **12.5%.**
- From the age group of **"36 to 50"**years **n=11** number of patients positive for both males and females, form the total **n=11** the male patients were **n=9** positive for Dengue with the percentage of **37.5%** and females were **n=03** with the percentage of **12.5%.**
- From the age group **"51 to 65"**years **n=02** number of patients positive for Dengue in both males and females, form the total **n=02** the male patients were **n=0** positive for Dengue with the percentage of **0%** and females were **n=2** number of patients positive for malaria with the percentage of **8.3%**.

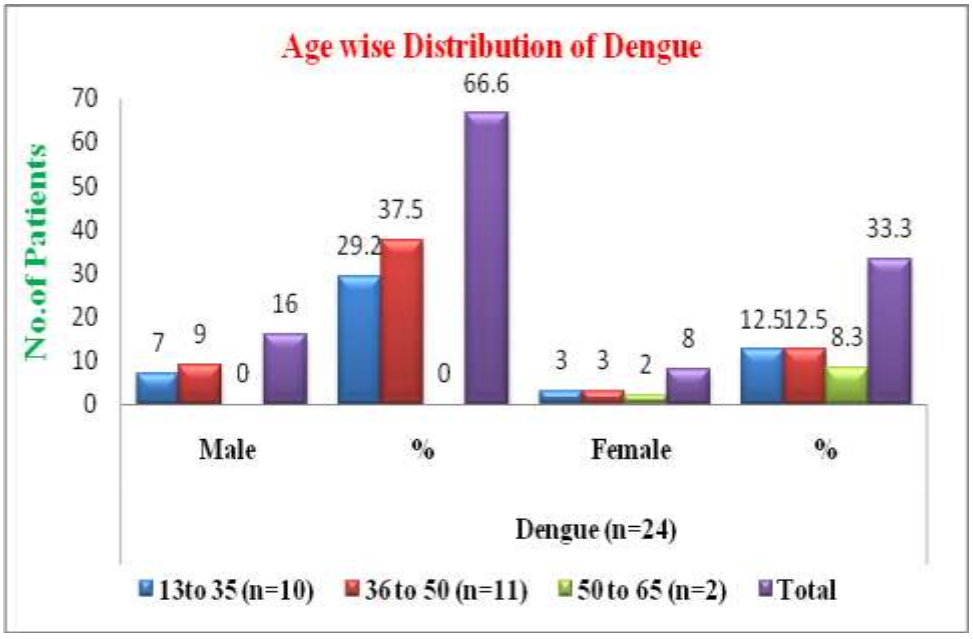


Figure No.3: Age wise Distribution of Dengue

Age wise distribution of chikungunya:

Table No.5: Age wise Distribution of Chikungunya

Age	Chikungunya (n=4)			
	Male	%	Female	%
13 to 35 (n=1)	1	25	0	0
36 to 50 (n=2)	1	25	1	25
50 to 65(n=1)	0	0	1	25
Total	2	50	2	50
MEAN S D	0.66 0.57	11.06 9.58	0.66 0.57	11.06 9.58

ODDS RATIO: 1.0, P< 1.0

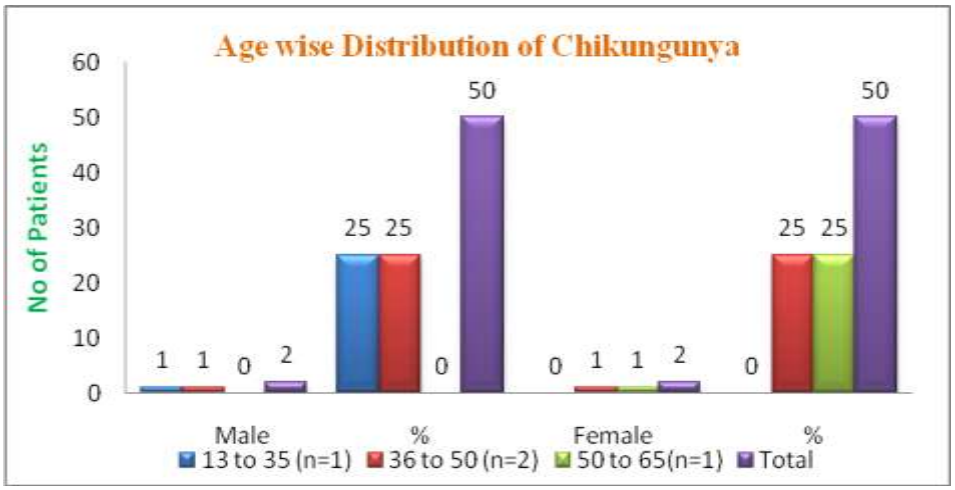


Figure No.4: Age wise Distribution of Chikungunya

RESULT:

From the **Table No:6** explains the Month wise Discription of Malaria, Dengue and Chikungunya positive patients from the month of **April 2017** to month of **October 2017**.

A total number of **n=100** cases of Malaria, Dengue and Chikungunya positives were collected, from the month wise collection a total number of **n=72** cases of positive of malaria was present in both males and female patients with an **Mean of 10.2** and **Standard Deviation 6.6**.as same as Dengue was **n=24** number of cases of positives and Chikungunya was **n=4** number of positive cases were collected in both males and females in the period of **April 2017 to October 2017**.In **August** there is **highest n= 21** number of positive of malaria is present in both males and females followed by **September second highest n=18** number of positive of malaria present in both males and females. followed by **October n=09**, **July n=09**,**April n=06**,**May n=05** and has a **least number n=04** of positive cases of malaria is present in the month of **June**.

In Dengue **n=24** number of patients which are positive for dengue fever in the period of **April 2017 to October 2017** with the **Mean of 3.4** and **Standard Deviation 4.1** , in this the highest **n=11** number of patients were present September in both male and female patients, and second highest number of patients **n=07** were present in October followed by **n=03** in August, **n=02** in July, **n=01** and there is **n=0** of cases were present in April and May.3333

In chikungunya **n=04** number of patients both males and females positive for Chikungunya fever in the period of **April 2017 to October 2017** with the **Mean of 0.5** and **Standard Deviation 0.7**.in this **n=2** is the highest number of patients in **August**, and **n=1** number of patients present in the month of **October** and **September** and there is no **(n=0)** cases were present in **April, May, June** and **July**

RESULT:

In this study **main two species** of plasmodium which are involved in the malaria fever they are ***Plasmodium vivax*** and **plasmodium falciparum**. From the **Table No.6** ***Plasmodium***

vivax has **n=22** number of patients in both male and females. ***Plasmodium falciparum*** has the **highest n=38** numbers of patients in both males and females, in these females are more affected by ***Plasmodium falciparum***. **n=12** number of patients are affected with **clinical malaria.**

In the **Figure No.7** number of patients on y-axis taken and frequency of malaria species in x-axis maximum peaks are observed ***plasmodium falciparum,* n=38**

RESULT:

From the **Table No.8** explains the complications of malaria, in this study different types of diseases are complicated with malaria they are ***Plasmodium viavx +ve*** affected with ***Thrombocytopenia*** has **n=4** number of patients, ***Plasmodium falciparum +ve*** affected with ***thrombocytopenia*** has **n=5** number of patients ,***Complicated malaria*** affected with ***Jaundice*** has **n=8** number of patients , ***Complaicted malaria*** affected with ***Hepatitis*** has **n=4** number of patients, ***complicated malaria*** affected with ***Acute Kidney Infections*** has **n=2** number of patients and ***Plasmodium falciparum +ve*** affected with ***Pneumonia*** has **n=2** number of patients. a **Total n=25** number of patients observed with complications in malaria from the **Total n=72** number of patients with **Mean** of **4.1** and **Standard Deviation 2.2**

RESULTS:

From the **Table No.9** explains the Complications in Dengue, in this study three types of diseases are complicated with Dengue Fever, in this study total no of patients affected with **Dengue n=24.** From the total number of patients, **Dengue** with **Thrombocytopenia** has **n=4** number of patients, **Dengue** with **Acute Kidney Infections** has **n=2** number of Patients and Dengue with **Sepsis** and **Acute Kidney Infection** has **n=1** number of patients were recorded with an **Mean** of **2.3** and **Standard Deviation 1.5.**

Figure No.9 shows the graphic representation of complication in dengue with a bar diagram. The **highest** range of peaks observed in **Dengue** with **Thrombocytopenia n=4**

RESULTS:

From the Table No.9 explains the co-infections of Malaria,Dengue and Chikungnya fevers,in this study a total **n= 100** patients were taken for the study, from this total **Malaria(n=72), Dengue(24)** and **Chikungunya** has **(n=04).**

Co-infecions occurred among these diseases in a different proportions they are **Malaria** with **Dengue+ve** has **n=3** number of patients,malaria with **Dengue+ve** and **Jaundice** has **n=5** number of patients and **Dengue** with **Chikungunya** has **n=2** number of patients with an **Mean** of **3.3** and **Standard Deviation 1.5.**

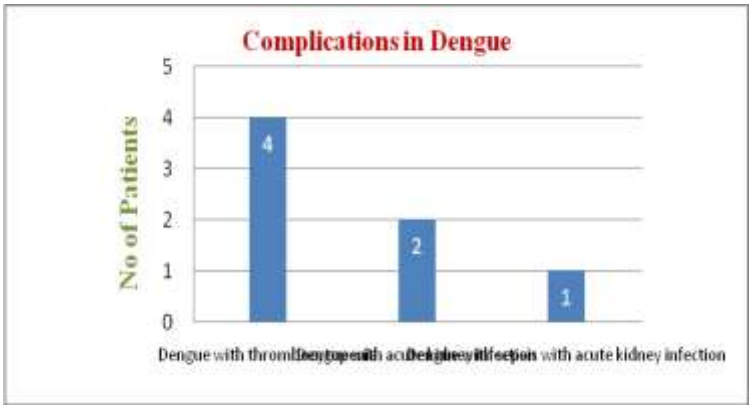
SUMMARY AND CONCLUSION

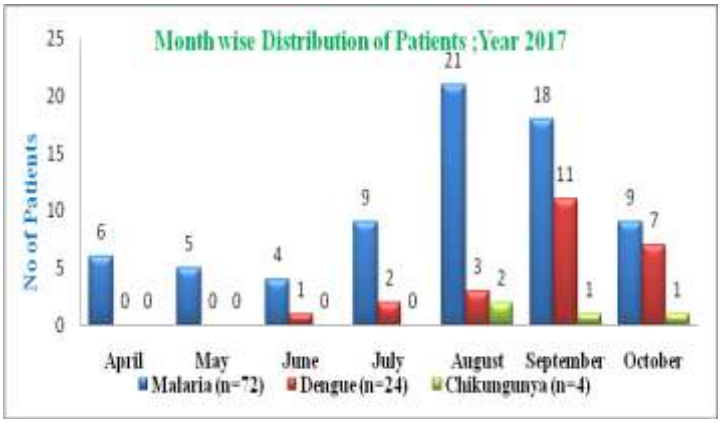
The present study is a prospective observational study conducted over a period of **6 Months(180 days)** in patients attending the in-patient Department of General Medicine in King George Hospital Visakhapatnam, who satisfied the inclusion and exclusion criteria of the study. After obtaining the approval of Institutional Ethics Committee and consent from the patients, detailed clinical history and clinical examination of the patient were done.The data recorded was tabulated and evaluated using SPSS Software and Statistical techniques. The higher prevalence of Malaria, Dengue and Chikungunya Fevers is noted among Males **52%** than Females **48%,** in which **Malaria has 72%, Dengue 24%** and **Chikungunya 4%.**The results correlate well with other studies undertaken in North India and South India. High prevalence amongst males is probably due to more outdoor activities by males in comparison to females which results in more exposure to day biting mosquitoes. The maximum Prevalence of age in between **13 to 35 years**, These findings are consistent with other Indian studies, Active adults are doing more outdoor work so there are more chances for them to get infected.

In **Malaria** patients **Females** are more positives with **55.5%** and in **Dengue** patients **Males** are more positives with **66.6%** and in **chikungunya** Males and females are **equally affected with 50%.**

To identify the seasonal variation of the disease, analysis of the data on monthly basis was done. The infection started spreading in **August** peaked in **September** and **October**.

The seasonality of transmission of dengue with increased activity in monsoon and post monsoon season was seen in the present study.





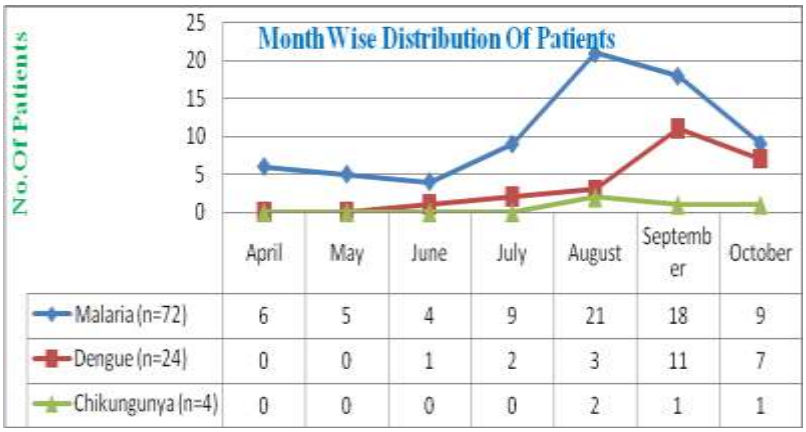


Figure No.6: Month wise Distribution of Malaria, Dengue and Chikungunya

Table No.7: Frequency of Malaria Species

Frequency of malaria species	**No. of patients**
Plasmodium vivax	22
Plasmodium falciparum	38
Clinical malaria	12
Total	**72**

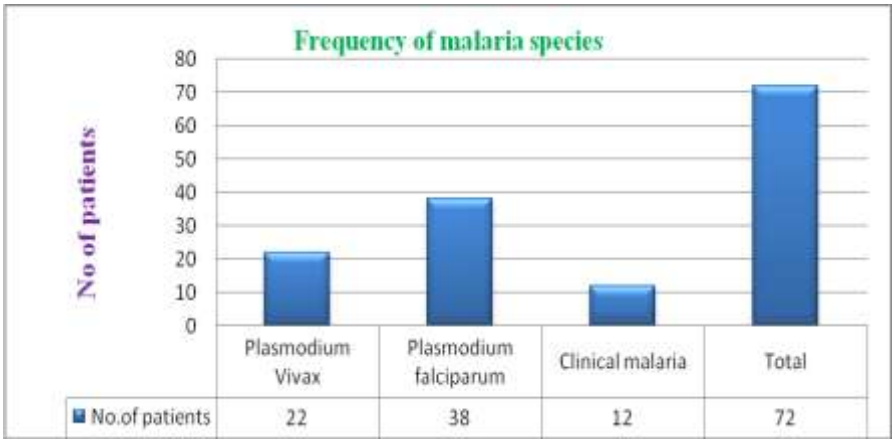


Figure No.7: Frequency of Malaria Species

Table No.8: Complications of Malaria

Complications of malaria	No.of patients
P.v +ve malaria with Thrombocytopenia	4
P.f +ve malaria with Thrombocytopenia	5
Complicated Malaria with Jaundice	8
Complicated Malaria with Hepatitis	4
Complicated Malaria with Acute Kidney Injury	2
P.f +ve Malaria with Anemia and Pneumonia	2
Total	**25**
MEAN	4.16
S D	2.22

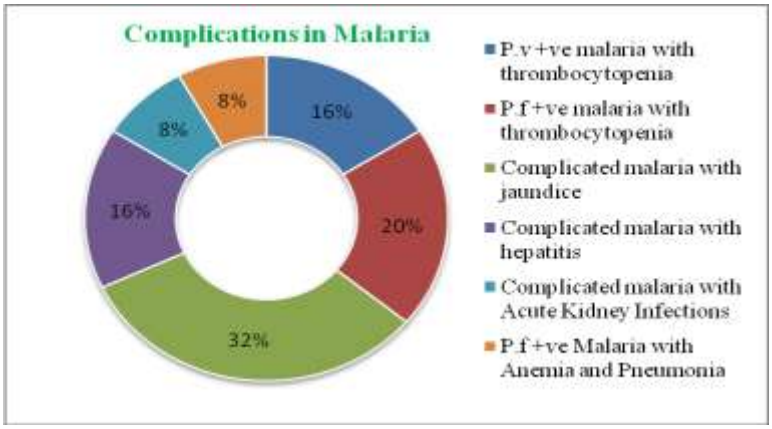


Figure No. 8: Complications in Malaria

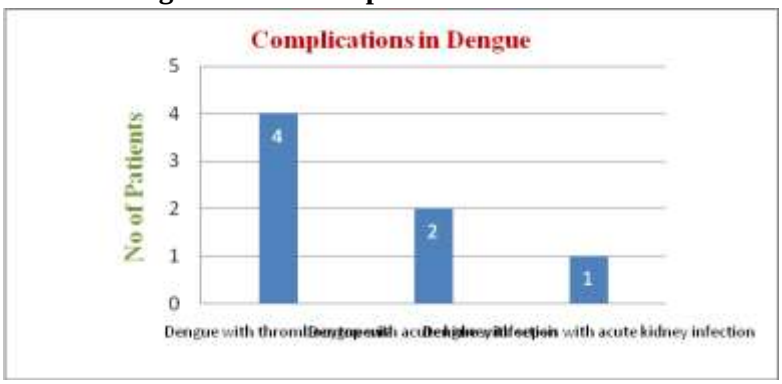


Figure No. 9: Complications in Dengue

Table No.9: Complications in Dengue

Complications in Dengue	**No.of patients**
Dengue with Thrombocytopenia	4
Dengue with Acute Kidney Injury	2
Dengue with Sepsis with Acute Kidney Infection	1
MEAN S D	2.33 1.52

Co-infections	**No.of Patients**
Malaria with Dengue +ve	3
Malaria with Dengue +ve and Jaundice	5
Dengue with Chikungunya	2
MEAN **SD**	**3.33** **1.52**

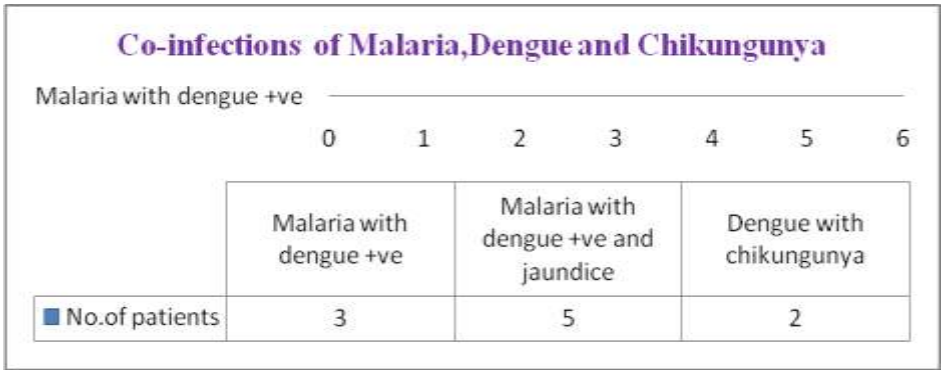


Figure No.10: Co-infections of Malaria,Dengue and Chikungunya

Table No.10: Co-infections of Malaria, Dengue and Chikungunya

Several complications with malaria like Thrombocytopenia, Jaundice, Anemia, Acute Kidney Injuries, Hepatitis and Pneumonia. In Dengue also Thrombocytopenia, AKI and Jaundice like complications are affected and also co-infections also present in this study like Malaria with Dengue and Dengue with Chikugunya. Mainly the patients which are from rural areas like Paderu, Chodavaram, Pendurthi, Gajuwaka, Anakapalli,and other rural areas was more affected with Malaria and Dengue positives by ***Plasmodium falciparum***, ***Aedes aegypti*** especially females were more affected by ***P.falciparum*** compared than ***Plasmodium vivax***. There are lots of marshy places which provide excellent mosquito breeding places. Further, it has been recently declared a megacity and as a result, rapid unplanned urbanization with unchecked construction activities and poor sanitation facilities contribute to fertile breeding grounds for mosquitoes. In tribal areas and Hillary regions of Visakhapatnam and also more humidity areas growth of these parasites induces the life threatening diseases, So people should have awareness about the living areas and living conditions, clean and neat surroundings, using mosquito coils, mosquito nets to avoid the mosquito biting. Government has to conduct the awareness programmes for the prevention and control methods to control these vector transmission diseases.Since the current study is a hospital base observational study with small sample, lesser number of patients reporting with febrile symptoms and other symptoms that are uneasy to their health. The results were not applicable to general population.therfore it is recommended that there is a need for number of longitudinal studies with follows up to be conducted in near future to confirm these findings.

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