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AWARENESS ABOUT THE RISK FACTOR AND COMPLICATIONS OF MALARIA IN ASSAM - A SURVEY

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ABSTRACT

Introduction: Malaria is one of the dangerous diseases around the world . Due to the bite of an infected Anopheles mosquito . It can be transmitted from mother to unborn child through blood transfusion.Mainly in central China during the 1960s and 1970s, the malaria outbreak happened on a larger scale where it affected the public health and socio-economic development of China. In Northeastern states of India is the major cause for malaria where Plasmodium falciparum is the highest predominant parasite . Materials and Methods : A set of questionnaires was formed about awareness about the risk factor and complication of malaria in Assam and was distributed using google form link .To minimise the sampling bias to check the validity, internal and external, to minimise error in questions, avoid leading questions.We have distributed our survey to 100 people in Assam . We have used SPSS for statistical software .Result :75.5 % are aware of malaria disease but 24.5 % are still not aware . 44.55 % say the symptoms are fever as majority , 42.5 % say chills , 9.09 % cause vomiting / Nausea , 1.82 % say loss of appetite . It shows how we can prevent the breeding of malaria, 44.55 % say by cleaning households, 18.18 % say drainage of stagnant water, 3.64 % don' t know where malaria breeding takes place. .Conclusion :Within the limitations of the study we can conclude that the Assam population is having good Knowledge and awareness about malaria and risk factors .

KEYWORDS: Assam ;Complications;Factors ; Malaria ; Online survey

INTRODUCTION

Malaria is an acute febrile illness caused by plasmodium parasites. It is a very serious public health threat because of the severe and fatal outcome. Malaria is quite unstable due to sporadic and seasonal transmission of low endemicity(1). After 73 years Independent malaria is spreading all over India and the tribal community which account as 50 % of malaria (2). Malaria is mainly caused by the bite of an infected female Anopheles mosquito. Malaria is having 5 parasite species which cause malaria. We can find 400 different species of Anopheles mosquito all over the world. Plasmodium parasites are starting to develop resistance to the frontline of antimalarial drugs (3). Historically, China was the main malaria-endemic country. Mainly in central China during the 1960s and 1970s, the malaria outbreak happened on a larger scale where it affected the public health and socio-economic development of China (4). Health education and prevention of malaria should be implemented in our country (5). Malaria is mainly the risk factor among maternal and neonatal morbidity and mortality in such cases as maternal anaemia, preterm delivery and placenta malaria which lead to low birth weight babies (6). A parasite is mainly affected in our Red blood cells and it enters our RBC within 48 to 78 hrs then it starts destroying our cells. The main signs and symptoms of malaria are fever, chills, Headache, Sweating and Nausea. It can be transmitted from mother to unborn child through blood transfusion. Mature parasites mainly affect RBC cells. About three million cases have been reported until now in the South East Asia region (WHO) each year and India is having 60 % of the total cases (7). People travelling to malaria

areas are at an increase in malaria and lead sickness and death (8). At present official malaria in India is available at the National vector-borne disease control programme which indicates 0.7 -1.6 million confirmed cases and 4000 - 1000 deaths annually (9). Mainly malaria breeding sites are near to bed bug infestation, outdoor sleep due to bedbugs and households with poor bed nets this is the reason that causes malaria in households (10). Prevention of malaria with knowledge and awareness is better to stay healthy (11). P.Vivax is the main cause of death in Americans where 75 % of malaria is caused by P.Vivax till now it has been reported. Malaria is the major problem in Assam where 30- 40 % are at high risk (12). In Northeastern states of India is the major cause for malaria where Plasmodium falciparum is the highest predominant parasite (13). As malaria cases have been found all month of the year during May -June the cases have been more detected, and it has been found that during heavy rainfall malaria breeding is more (14).

Other authors have done similar studies like the laboratory of molecular and genomic malaria control in India (15). Another study was done malaria prevention and control in India (16), malaria vaccine (17), Avian malaria parasite (18), advances in malaria drug discovery (19), the complication of malaria (20).Our team has extensive knowledge and research experience that has translated into high-quality publications (21–29),(30–35),(36–42)(43–48).Our study aims to create awareness about the risk factor and complication of malaria in Assam.

MATERIALS AND METHODS

The study setting is a prospective observational study using online surveys. The pros in my study are economical, easy to create, wide reach, gather larger data and quick interpretation. The cons are Homogenous population, Response bias and survey fatigue. The approval was given by scientific review board Saveetha dental college, Chennai. The no people involved is 3 (Research, Guide, Reviewers). Sampling for the survey we use Random sampling methods. Sampling size we consider as 100. To minimise the sampling bias to check the validity, internal and external, to minimise error in questions, avoid leading questions.

For data collection, we have used our self-structured questionnaire. No of questions include 20. Questionnaire validity is checked by Internal validity like risk factor and complications of malaria in Assam, external validity checks are aware of the risk factor of malaria. Data collection software uses Google form link. List of output is demographic information about the risk factor and complications of malaria. The method of representing each output is Pie chart and Bar diagrams

Chi-Square analysis was performed and $p<0.05$ was considered as statistically significant.

List of Independent variables in our study is weight, Height and sex. List of dependent variables in our study is Knowledge, Attitude and perception.

RESULTS AND DISCUSSION

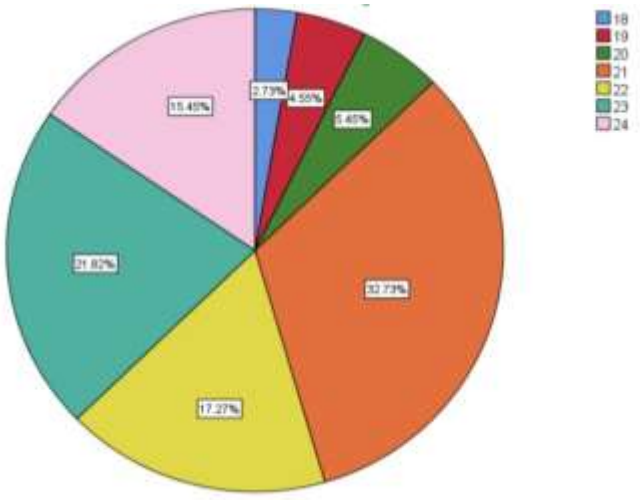

Figure 1 : Pie chart shows the distribution of the age group of respondents among participants . Blue color denotes 18 years , red color denotes 19 years , green color denotes 20 years , orange color denotes 21years , yellow color denotes 21 years , blue color denotes 22 years , grey color denotes 23 years , pink color denotes 24 years . Majority (32.37 %) of the participants were of 21 years of age.(orange)

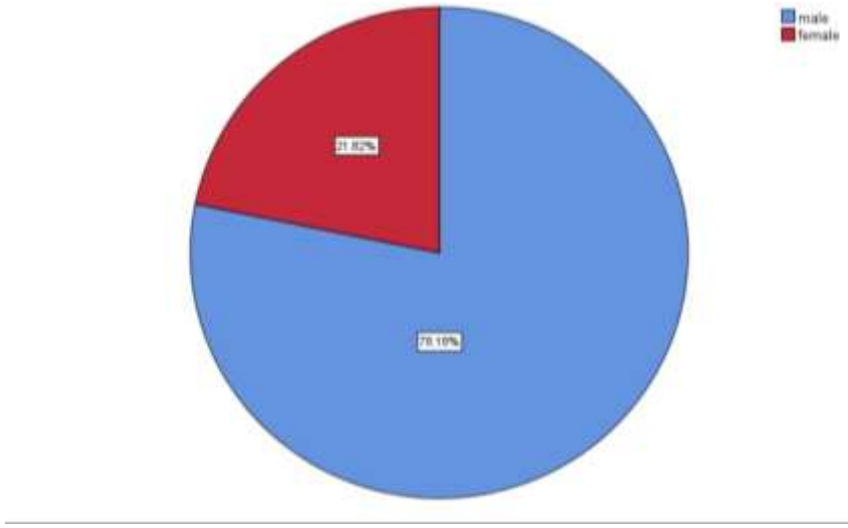

Figure 2 : Pie chart shows the distribution of the gender among participants . Blue color denotes male and red color denotes female .Majority (78.18 %) of the participants were males .

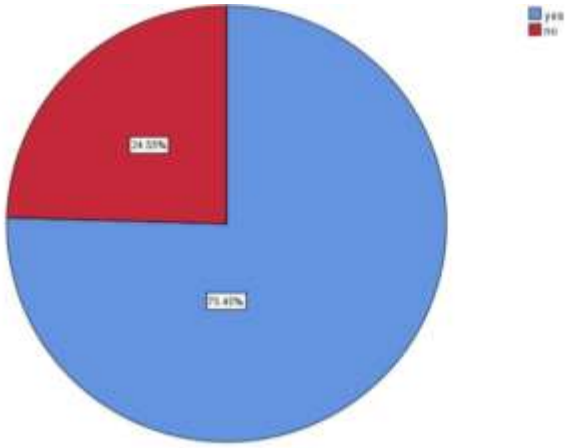

Figure 3 : Pie chartshows frequency distribution of the awareness on malaria disease among participants . Majority (75.45 %) of the participants were aware of malaria disease (blue) and (24.55 %) of the participants are still not aware (red) .

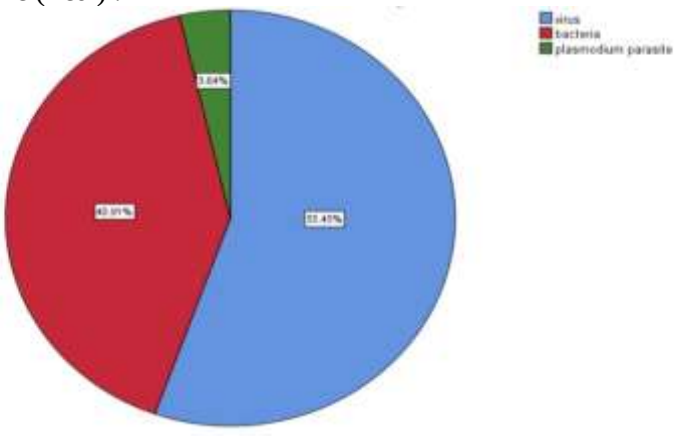

Figure 4 : Pie chart shows frequency distribution of the awareness of the causative microbe of malaria among participants. Blue colour depicts virus as causative microbes , red colour depicts bacteria as bacteria , green depicts plasmodium parasite as causative microbes . Majority (55.45 %) of the participants responded virus (blue) as the causative microbe causing malaria.

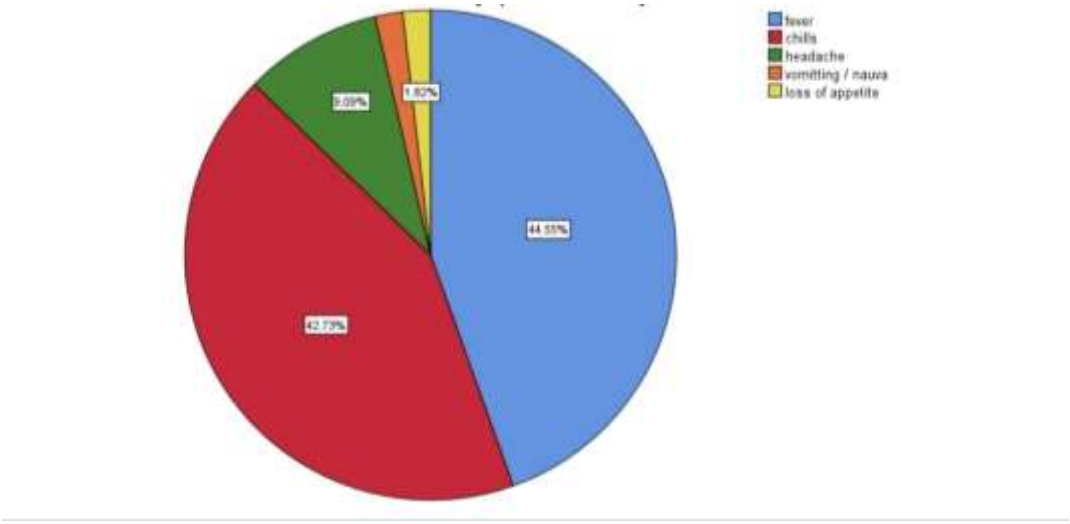

Figure 5 : Pie chart showing frequencydistribution of the awareness of symptoms of malaria among participants . Blue color depicts fever as symptoms , red color depicts chills fever as symptoms , green color depicts headache as symptoms , orange color depicts vomiting / nausea as symptoms , yellow color depicts loss of appetite as symptoms . Majority (44.55 %) of the participants responded to fever as the symptoms of malaria.

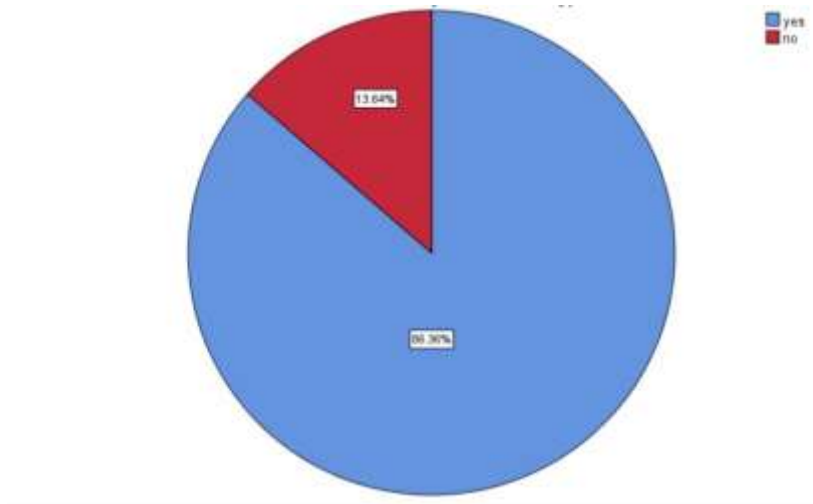

Figure 6 : Pie chart showing frequency distribution of the responses for the awareness of different types of malaria among participants . Majority (83.63 %) of the participants responded " Yes " (blue) followed by (13.64 %) of the participants responded" No" (red) .

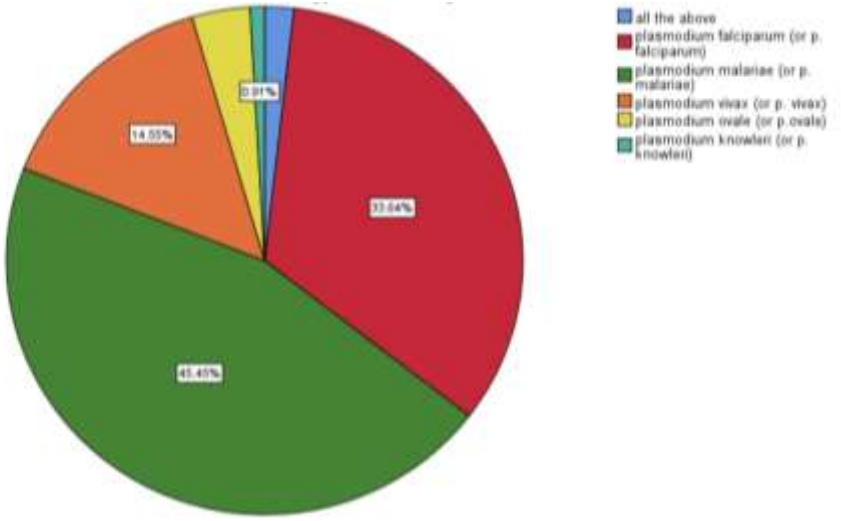

Figure 7 : Pie chart showing frequency distribution of the responses for various types of malarial parasites . Blue color depicts all of the above as a type of malaria parasite , red depicts plasmodium falciparum as a type of malaria , green depicts plasmodium malaria as a type of malaria , orange color depicts plasmodium vivax as a type of malaria , yellow color depicts plasmodium ovale as a type of malaria , light blue depict plasmodium knowlesi as a type of malaria . Majority (45.45 %) of the participants responded plasmodium malaria (green) , (33.64 %) of the participants say plasmodium falciparum (red) , (14.55 %) of the participants say plasmodium vivax (orange) and (0.91 %) of the participants says plasmodium ovale , knowlesi and all other (yellow) (light green) (blue **) .**

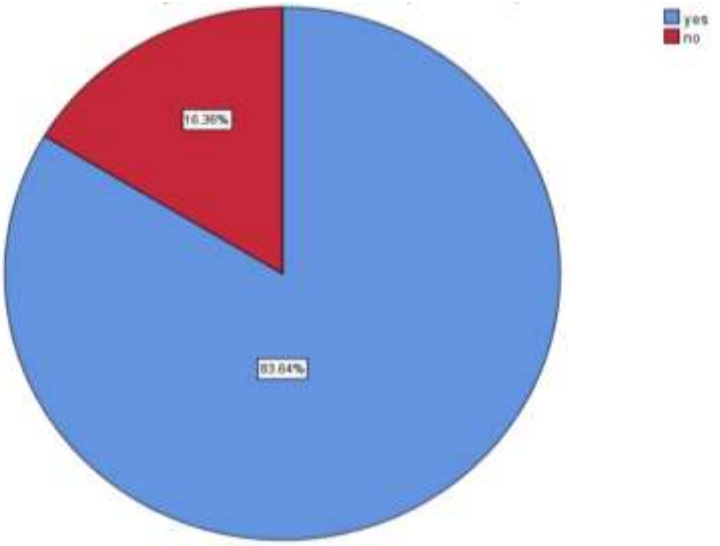

Figure 8 : Pie chart showing frequency distribution of the awareness on transmitting organism female Anopheles mosquito among participants . Majority (83.6 %) of the participants responded that they are aware of Anopheles mosquito (blue) and (16.36 %) of the participants were not aware (red).

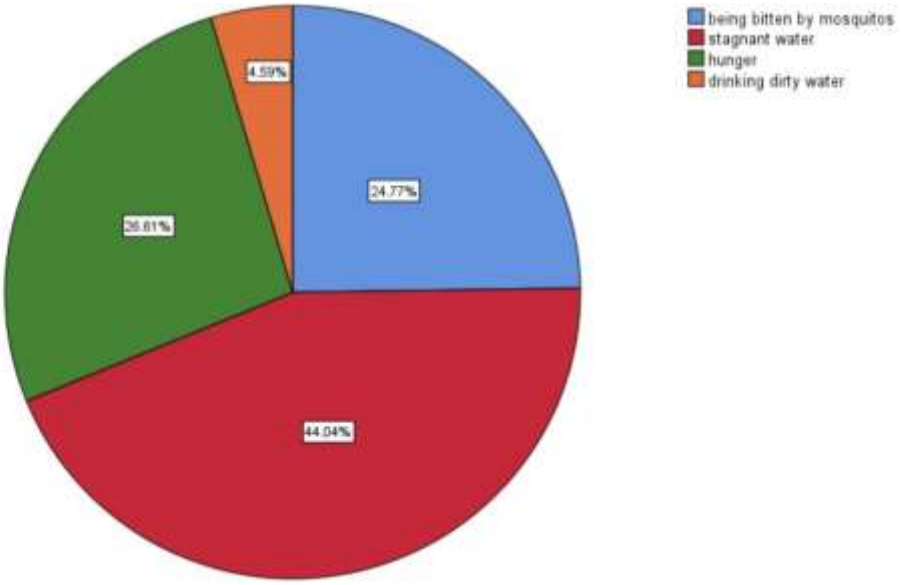

Figure 9 : Pie chart showing frequency distribution of the awareness of cause of malaria among the study population . Majority (44.04 %) of the participants agreed due to stagnant water (red) ,(24.77 %) of the participants responded due to biting mosquitoes (blue) , (26.61 %) of the participants responded due to hunger (green) and (4.59 %) of the participants responded due to drinking dirty water (orange) .

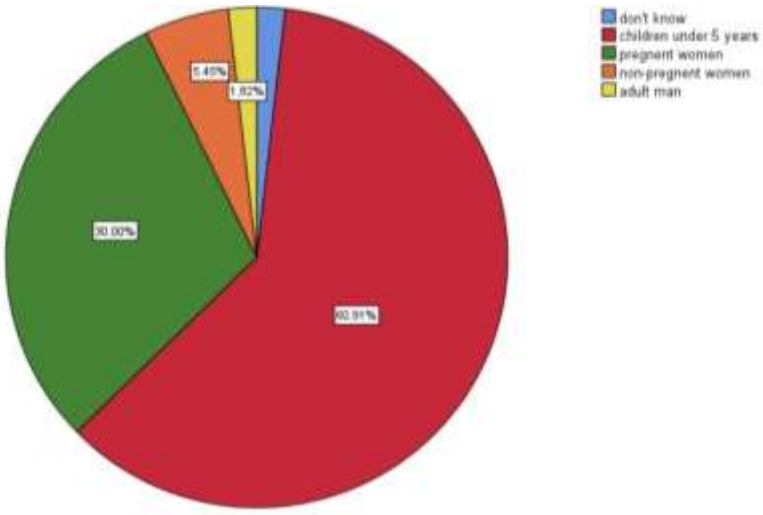

Figure 10 : Pie chart showing frequency distribution of the people who can be easily infected by malarial parasites among participants . Majority (60.91 %) of the participants responded children under 5 years are mostly affected (red) , (30.00 %) of the participants responded pregnant women (green) , (5.45 %) of the participants responded non-pregnant (orange) , (1.82 %) of the participants responded adult men (yellow) and (1.82 %) responded don't know (blue) .

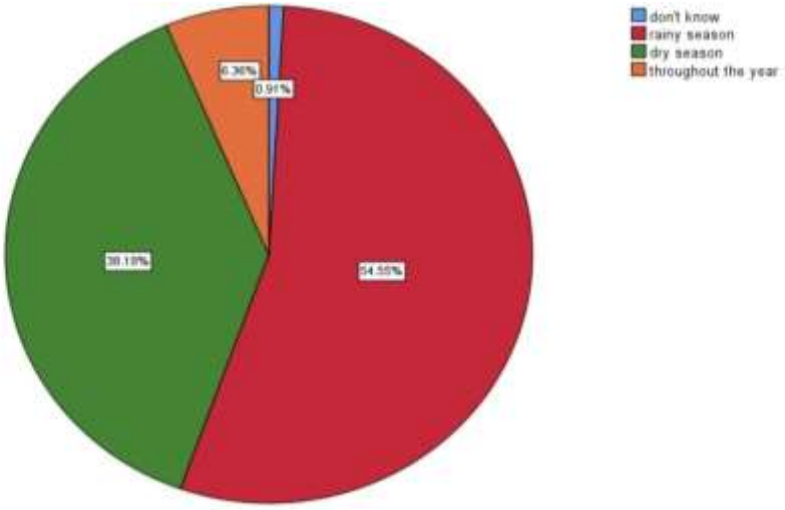

Figure 11 : Pie chart showing the frequency distribution of the favourable season for increase in mosquito bites among participants , Majority (54.55 %) of the participants responded due to rainy season, (38.18 %) of the participants responded dry season , (6.36 %) of the participants responded throughout the year and (0.91 %) were not aware.

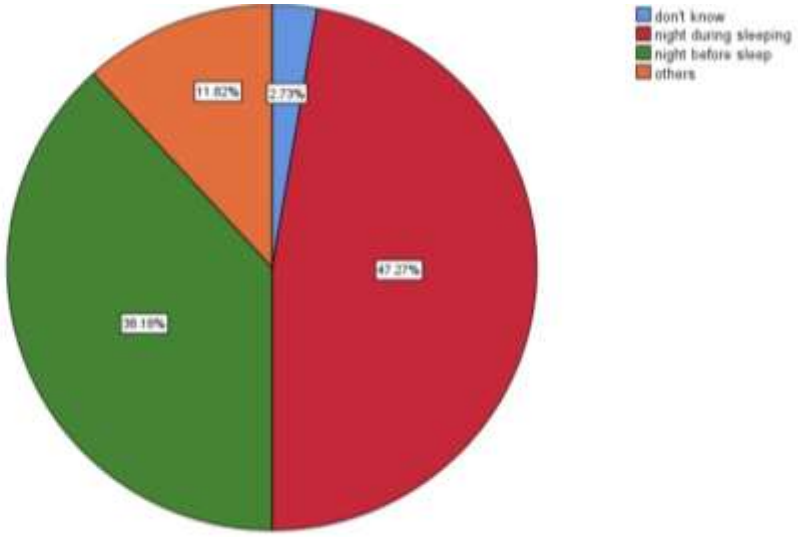

Figure 12 : Pie chart showing the frequency distribution of the awareness on mosquito activity level. Majority (42.27 %) of the participants respondedmosquitoes are more active during sleep hours (red) , (38.18 %) of the participants responded mosquitoes are more active during night (green) , (2.73 %) of the participants are not aware of mosquito activity level (blue) and (11.82 %) mosquitoes are more active at any time.

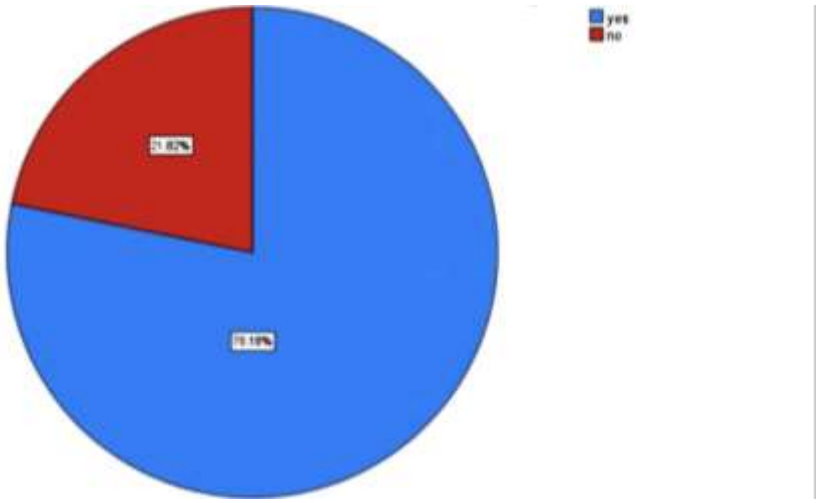

Figure 13 : Pie chart showing the frequency distribution of the awareness of risk of malaria in the rainy season among participants . Majority (78.18 %) of the participants responded "Yes' ' that they are aware about the risk of the rainy season (blue) and (21.80 %) of the participants responded "No' ' there is no risk in the rainy season. (red) .

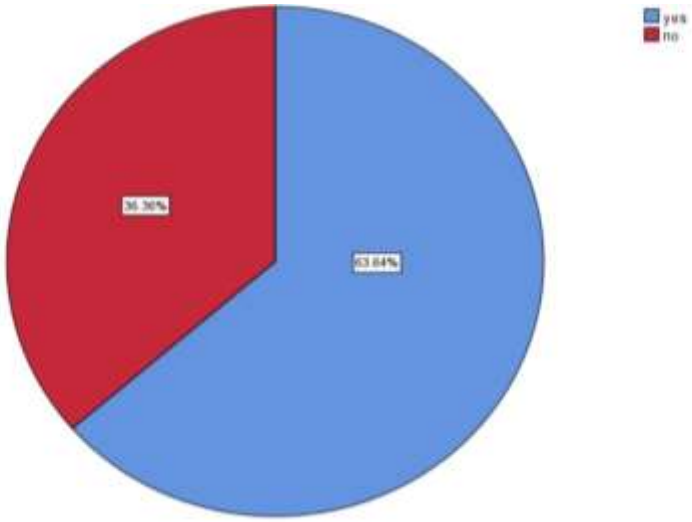

Figure 14 : Pie chart showing frequencydistribution of the medication paracetamol as an effective treatment among participants . Majority (63.34 %) of the participants responded that paracetamol can cure malaria (blue) and (36.36 %) of the participants responded that paracetamol cannot cure malaria (red) .

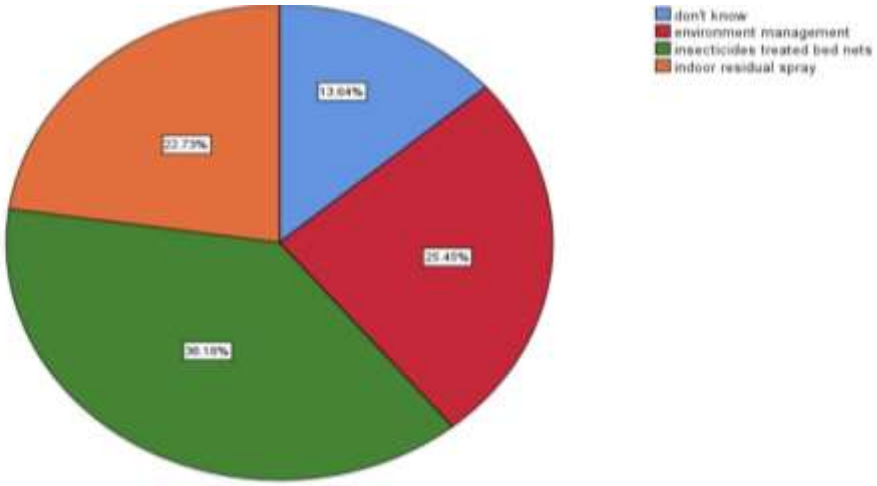

Figure 15 : Pie chart showing the frequency distribution of the methods for prevention of malaria among participants . Majority (38.18%) of the participants responded that by using insecticide-treated bed nets (green) , (24.5 %) of the participants responded that by using environment management (orange) , (22.73 %) of the participants responded by using an indoor residual spray (orange) , (13.64 %) were not aware of any methods(blue) .

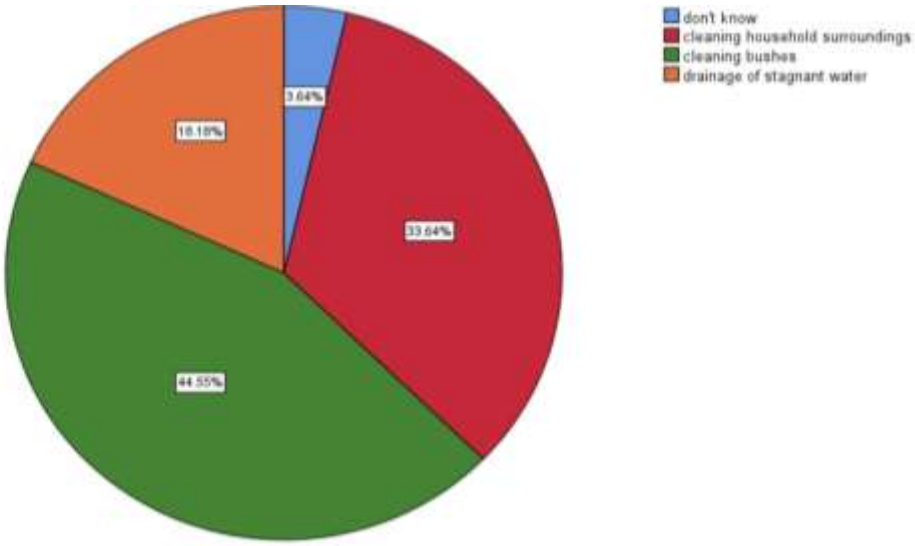

Figure 16 : Pie chart showing the frequency distribution of the precautions taken for prevention of malarial parasite breeding among participants . Majority (44.55 %) of the participants responded cleaning brushes (green) , (33.64 %) of the participants responded cleaning household surroundings (red) , (18.18 %) of the participants responded drainage of stagnant water (orange) , (3.64 %) don' t know where malaria breeding takes place (blue) .

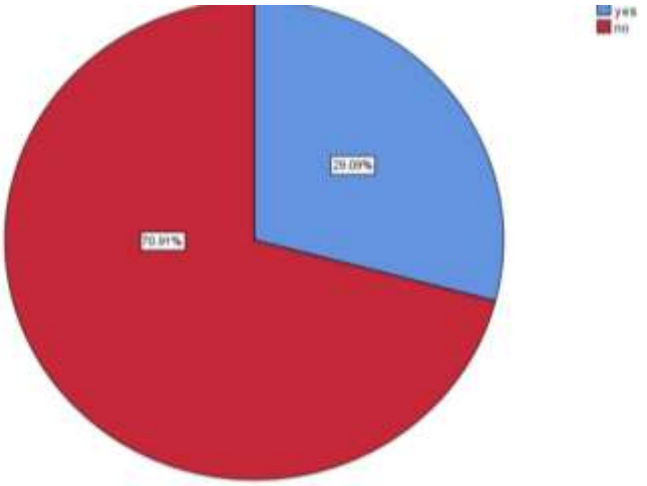

Figure 17 : Pie chart showing frequency distribution of the malarial parasites potency to kill human beings. Majority (70.91 %) of the participants responded "No" malarial parasites cannot kill human beings (red) and (29.09 %) of the participantsresponded "Yes" malarial parasites can kill human beings (blue) .

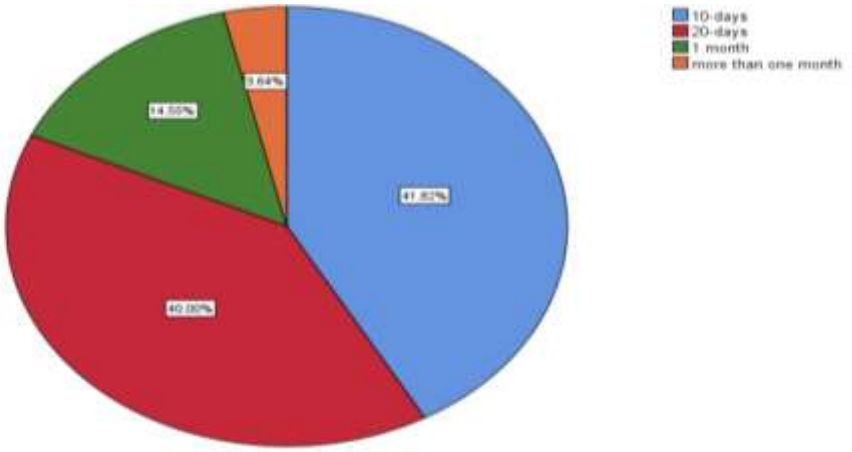

Figure 18 : Pie chart showing the frequency distribution of the time taken for treating malaria among participants . Majority (41.82 %) of the participants responded it will be require 10 days (blue) ,(40 %) of the participants responded it required 20 days (red) , (14.55 %) of the participants responded 1 month (green) , (3.64 %) responded that it required more than 1 month (orange).

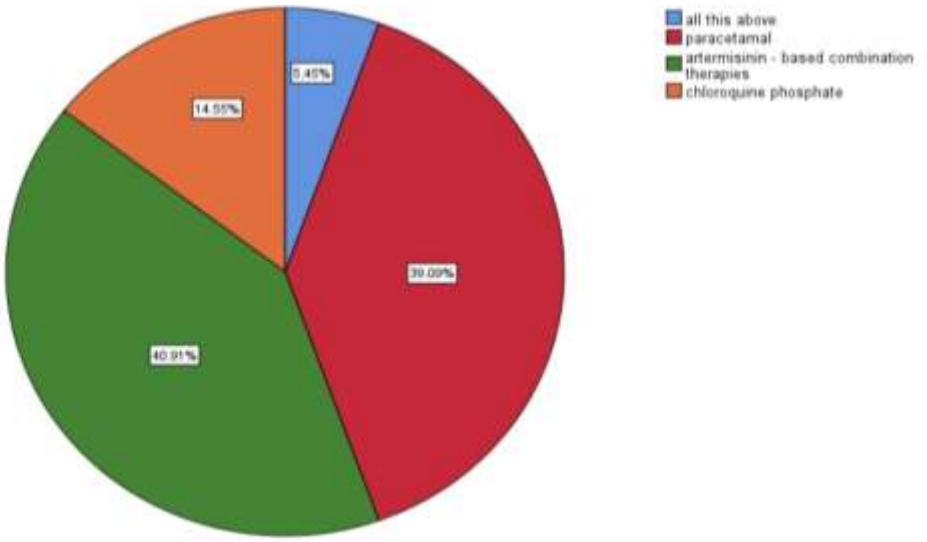

Figure 19 : Pie chart showing the frequency distribution of the most common antimalarial drugs known by the participants . Majority (40.9 %) of the participants respondedartemisinin-based combination therapies (green) , (30.9 %) of the participants respondedparacetamol (red) , (14.55 %) of the participants respondedchloroquine phosphate (orange) , (5.45 %) responded that all the above can be used as antimalarial drugs (blue) .

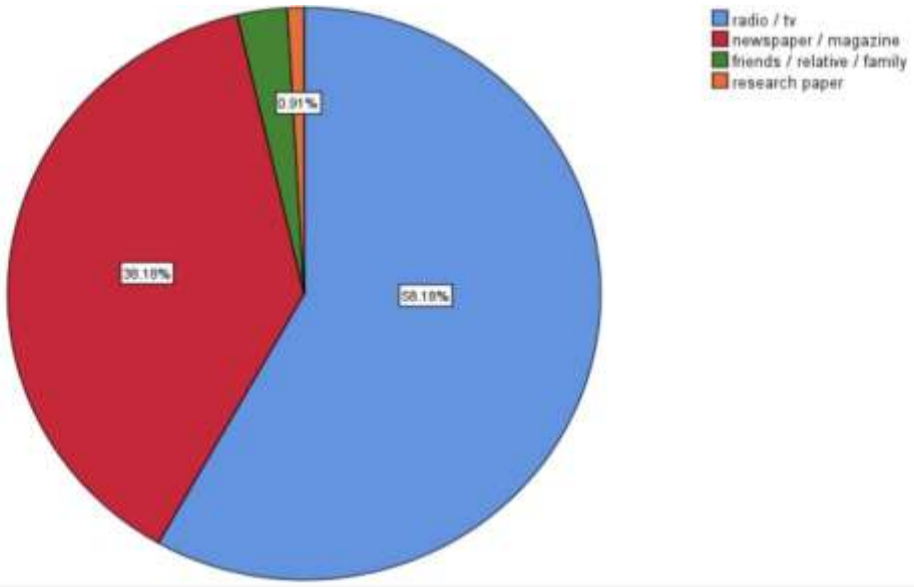

Figure 20 : Pie chart showing the frequency distribution of the source of information about malaria among participants . Majority (58.18 %) of the participants responded they were informed through Radio/Tv (blue) , (38.28 %) of the participants responded newspaper / Magazines (red) , (0.91 %) from friends/ family (green) and (0.91 %) of the participants responded that they gather information from research papers (orange) .

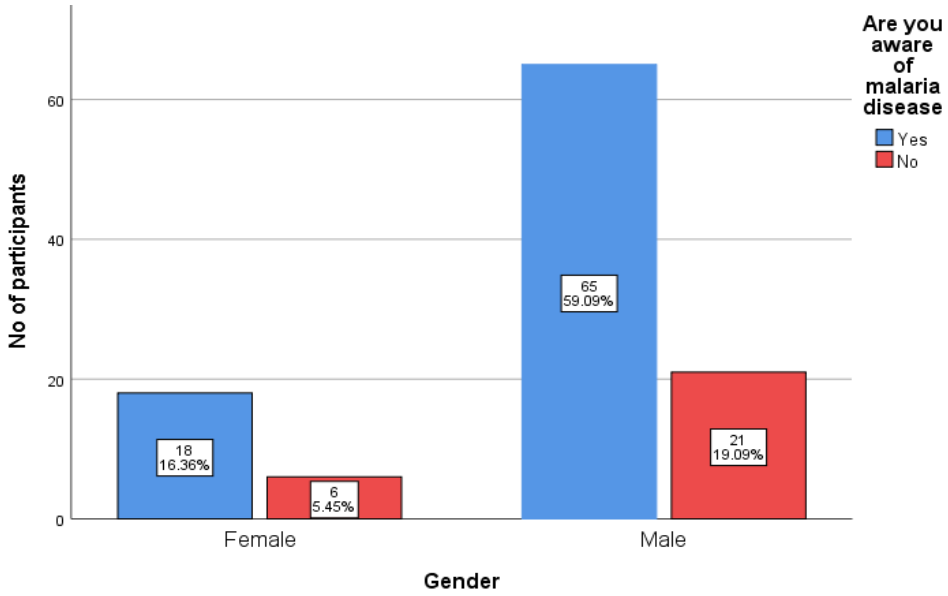

Figure 21 : Bar graph showing association between gender and awareness of malaria disease . X - axis represents the gender and Y -axis represents the no of participants of which red colour indicates Yes and blue color indicates No. Majority of the males (65 participants) are aware of the malaria disease rather than females. Chi - square value : 0.003 , DF : 1, p value : 0.953 (>0.05) hence statistically not significant.

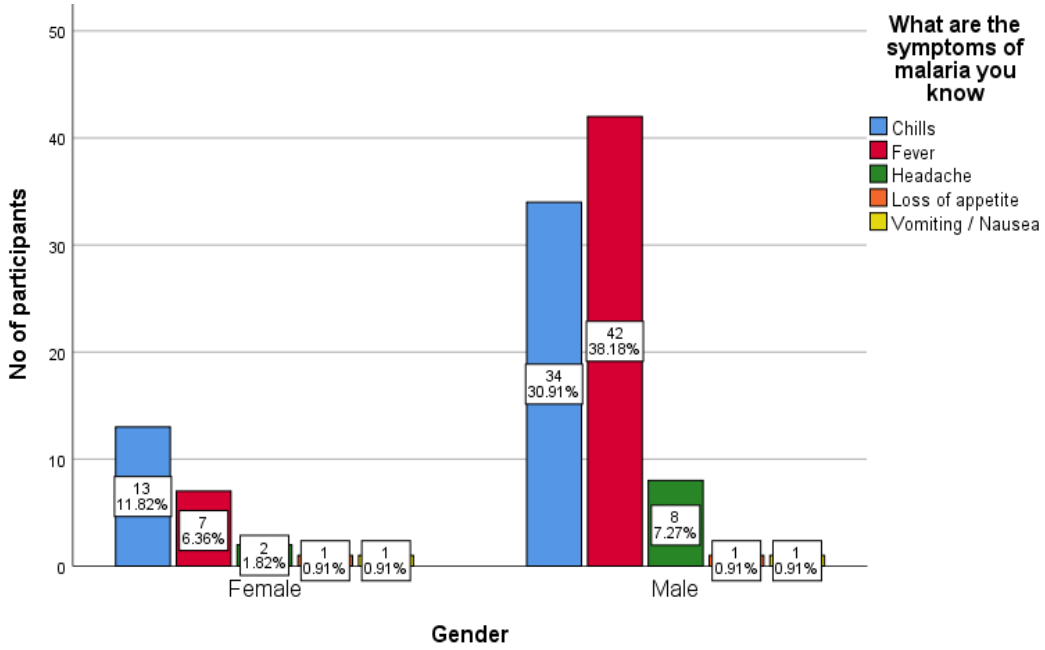

Figure 22 : Bar graph showing association between gender and with the symptoms of malaria disease. X - axis represents the gender and Y -axis represents the number of participants of which blue color denotes chills, red denotes fever , green denotes headache and orange denotes loss of appetite , yellow denotes vomiting /Nausea . Majority of male (42 participants) are aware of the symptoms of malaria rather than females. Chi - square value : 4.425 , DF : 4, p value : 0.348 (>0.05) hence statistically not significant.

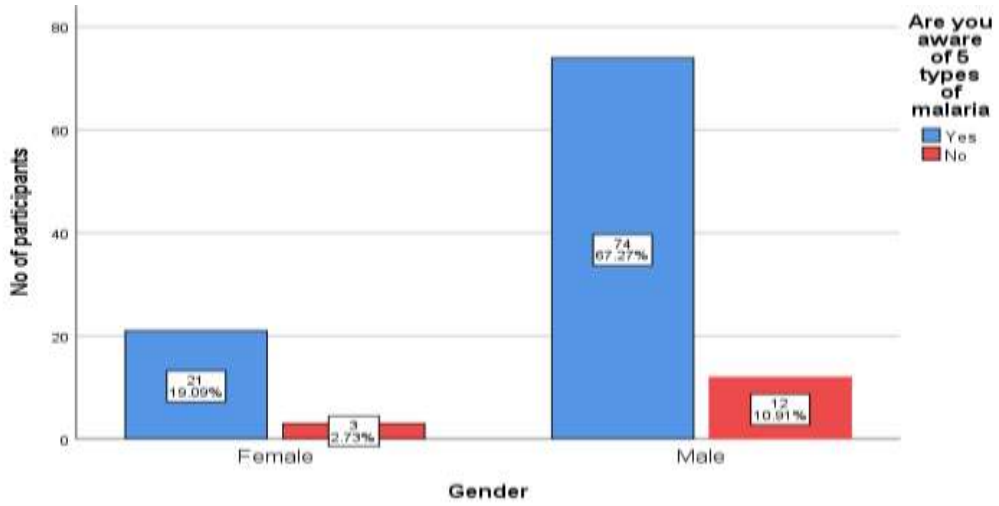

Figure 23 : Bar graph showing association between gender with the awareness of 5 types of malaria . X - axis represents the gender and Y -axis represents the number of participants of which red colour indicates Yes and blue color indicates No . Majority of male (74 participants) are aware of 5 types of malaria rather than female . Chi - square value : 0.034 , DF : 1, p value : 0.854 (>0.05) hence statistically not significant .

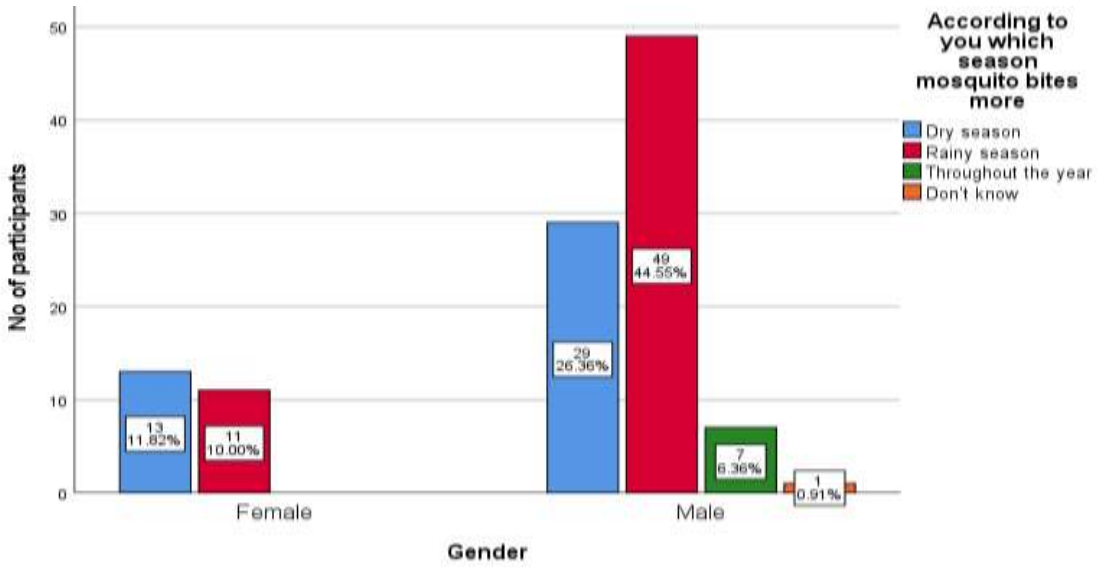

Figure 24 : Bar graph showing association between gender and with the season mosquito bites more. X - axis represents the gender and Y -axis represents the number of participants of which blue color denotes dry season , red denotes rainy season , green denotes throughout the year and orange denotes don't know . Majority of males (49 participants) are aware of the favourable season for mosquito bites rather than females . Chi - square value : 4.714 , DF : 3 , p value : 0.194 (>0.05) hence statistically not significant.

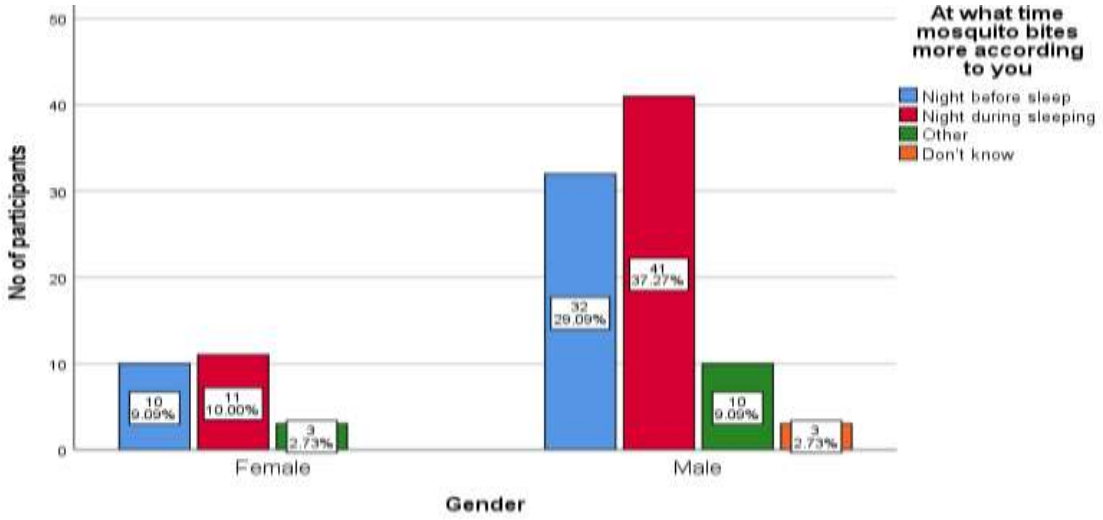

Figure 25 : Bar graph showing association between gender and with the peaktimefor mosquito bites. X - axis represents the gender and Y -axis represents the number of participants of which blue color denotes night before sleep , red denotes night during sleeping , green denotes others and orange denotes Don't know . Majority of male (41 participants) are aware of mosquito activity level rather than females . Chi - square value : 0.960 , DF : 3 , p value : 0.811 (>0.05) hence statistically not significant.

[Fig 1] It shows the age group of respondent like 2.7 % belong to age group 18, 4.5 % to age group 19, 5.5 % belong to age group 20, 32.7 % belong to age group 21, 17.3 % belong to age group 22, 21.8 % belong to age group 23, 15.5 % belong to age group 24.[Fig 2] It shows that the gender respondent is 72.8 % male and 21.8 % female . [Fig 3] It is asked that they are aware of malaria disease, 75.5 % say "Yes" they are aware of malaria disease 24.5 % say "No" they are still not aware of malaria disease. [Fig 4] It was asked that malaria is caused by, 55.5 % majority says that virus causes malaria, 40.9 % it cause by bacteria, 3.64 % says it cause by the plasmodium parasite. [Fig 5] It shows they are aware of symptoms of malaria, 44.55 % say " fever" is the symptoms of malaria, 42.7 % say chills, 90.9 % say it causes vomiting / Nausea and only 1.82 % say due to loss of appetite. [Fig 6] It shows they are aware of 5 types of malaria, 86.4 % say " Yes" they are aware of 5 types of malaria, 13.6 % say " No" still they are not aware of 5 types of malaria. [Fig 7] Types of malaria they are aware of, 33.6 % they know all the types of malaria, 45.5 % know only plasmodium malaria, 14 .5 % know as Plasmodium vivax. [Fig 8] They are asked where known Anopheles mosquitoes cause malaria, 83.6 % say "Yes" majority are aware of Anopheles mosquito, 16.36 % still don't know. [Fig 9] It was asked the cause of malaria, 44.04 % say due to stagnant water, 24.77 % say due to biting mosquitoes. [Fig 10] The question asked which type of people is mostly affected, 60.91 % say children under 5 years mostly affected, 30.00 % say pregnant women, 5.45 % say non-pregnant and 1.82 % say adult men .[Fig 11] It shows that mosquito bites, 54.55 % say rainy season, 38.18 % say dry season, 6.36 % say throughout the year, 0.91 % still don' t know. [Fig 12] It shows mosquito bite time, 42.27 % say it bites at night during sleep, 38.18 % say it bites the night before sleep, 2.73 % still don' t know and 11.82 % say for other reasons. [Fig 13] It shows that malaria is highest on rainy days, 78.18 % say "Yes' ' risk on rainy season, 21.80 % say "No' ' there is no risk on rainy season. [Fig 14] It was asked that paracetamol helps in malaria, 63.4 % majority say " Yes" it helps in malaria, 36.6 % say "No" it doesn' t treat malaria. [Fig 15] It shows the prevention of malaria, 38.18% say by using insecticide-treated bed net, 24.5 % say by using environment management, 22.73 % say by using an indoor residual spray. [Fig 16] It shows how we can prevent the breeding of malaria, 44.55 % say by cleaning households, 18.18 % say drainage of stagnant water, 3.64 % don' t know where malaria breeding takes place. [Fig 17] It shows that malaria can kill a person, 70.91 % majority say " No" malaria cannot kill a person but 29.09 % say "Yes" malaria can kill a person. [Fig 18] It asked that time required for malaria treatment, 41.82 % say it will be required 10 days, 40 % say it required 20 days, 14.55 % say 1 month, 3.64 % say it required more than 1 month. [Fig 19] It shows that they are aware of Antimalarial drugs or not, majority 40.9 % say artemisinin-based combination therapies, 30.9 % says paracetamol, 14.55 % say chloroquine phosphate, 5.45 % is saying all the above can be used as antimalarial drugs. [Fig 20] It shows

how they gathered information about malaria, 58.18 % say they got from Radio/Tv, 38.28 % say newspaper / Magazines, 0.91 % say friends/ family and 0.91 % gather information from research papers.

We have seen the association between gender and awareness of malaria disease [Fig 21] , symptoms of malaria disease [Fig 22] , awareness of 5 types of malaria [Fig 23] , season mosquito bites more [Fig 24] , mosquito bites time [Fig 25] .
[Fig 3] It has been asked whether they are aware of malaria, 75.5 % majority are aware of malaria which can be compared to a similar study conducted by JianHai Yin *et al* in the year 2013 as 60.46 % are aware of malaria, So we can say that many people are aware of malaria (49). [Fig 5] The figure shows symptoms of malaria, majority 44.55 % say " fever", which can be compared to a similar study conducted by Kennedy DiemaKonlan *et al* in the year 2019 it states that symptoms of malaria as "Fever " 87 % response, so we can say that major symptoms of malaria are fever (50). [Fig 9] It shows that cause of malaria, 44 % says it happens in stagnant water cause malaria, a similar study by the opposite finding by K Sivasangeetha*et al i*n the year 2015 it state mosquito spreads malaria, so as we got two different results in both studies but we can say that stagnant water is the major cause of malaria spread (51). [Fig 15] It was asked how to prevent of malaria, majority 38.18 % say insecticides treated bed net help to reduce malaria as we compare with similar finding done by Marie Louise Umwangange*et al* in the year 2018 it states that 37 % to 67 % use insecticides treated net for treating malaria, so we can say that insecticide net can prevent from malaria (52). [Fig 19] It shows that antimalarial drugs they are aware or not, majority 40.91 % says artemisinin-based combination therapies for treating malaria compared with opposing finding by PA Naing*et al* in the year 2017 it states that 16.3 % are aware of antimalarial drugs, so most of the population knows about antimalarial in both the studies (53).
This study has limitations as the sampling size was limited, including more criteria will show better understanding of the problem, online distribution, and population. In future it will help to increase the awareness about malaria and risk factors and complications among all the people in Assam and northeastern India.

CONCLUSION

Within the limitations of the study, we can conclude that the Assam population is having good knowledge and awareness about malaria, its etiological factors and complications. But still, there is a need for more knowledge about malaria, its preventive measures and the treatment required. So the Government of India and the Assam Government should take necessary steps to prevent the infections and protect people from malaria

AUTHORS CONTRIBUTIONS

Raja Kumar: Literature search, data collection, analysis, manuscript drafting.
Dr. Dhanraj M: Aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation and final corrections of the
manuscript.
V. Vishnu Priya: Has participated in the study design, statistical analysis and has supervised in preparation and final corrections of the manuscript.
Dr. L.KeerthiSasanka: Data verification, manuscript drafting, preparation of
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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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