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Malaria in Modern Day: A review article

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Abstract

Five species of Plasmodium Parasite has emerged, one of which is known as Plasmodium Malaria. Malaria is widely spread and infects over two million people annually. The causes of Plasmodium Malaria growing widely can vary from a country to another. Educating people on the prevention techniques and curing methods and treatments is essential to overcome this parasite and the life threatening disease it causes.

Key words: Malaria, Plasmodium, Diseases, Preventative, Infection Female Anopheles mosquitoes

INTRODUCTION

Review

P. Malaria infects humans as the definitive host through the intermediate host, known mostly as Female Anopheles mosquitoes *(figure; 1)*: the first study that proved this hypothesis was by Shute, P. G., and M. Maryon (1952). The female mosquito carries the parasite when they bite infected people to obtain blood. Reproduction and development of the parasite takes place inside the mosquito, hence, when the parasites reach the human body it travels to the liver where they mature and reproduce as stated Hector Caraballo and Kevin King, (2014) and Bledsoe GH, (2005) respectively. Plasmodium Malaria was discovered by Laveran, A. (1880), he found the cause of malaria to be the parasite Plasmodium despite the diseases' presence since the Greek and Roman civilizations over 2000 years ago.

Figure 1: *An Anopheles stephensi mosquito shortly after obtaining blood from a human. Jim Gathany,(2004).*

The Habitat of Plasmodium Malaria

P. Malaria parasite carried by the mosquito is found worldwide extending from 60° N to 46° S of the equator, where Honigberg, (1964) and Corliss, (1967) concluded that they live in places of a warmer temperature and tropical and subtropical regions. They also added that the human Malarial parasites usually live as intracellular parasite.

90% of the deaths and cases of Malaria are found in Africa and Uganda due to these countries temperature that aids the survival of this disease. P. malaria is a major leading cause of death in Asia and South America as well. Mosquitoes in general breed and live in places where fresh water can be located (such as after rainfall), and so is the case with the Female Anopheles mosquitoes carrying the parasite Plasmodium.

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Causes of Plasmodium Malaria

One of the major causes of the expansion of Malaria and the most common in African countries is poverty. The poor construction of the houses in most Africa does little to no help in preventing or protecting against the mosquitoes entering. In addition, most of the people living in rural areas can't afford having nets hanging over their bed (*Figure:2).* Mostly people in such areas can't afford the transportation or the medical care, even if they got diagnosed with the disease they usually can't afford the medicine. Lack of education about Malaria can be counted as a leading cause as well, declared Amber Pariona, (2017). There are several preventative techniques that can be considered but people don't know about them. Malnutrition causes a weakness in the immune system which causes the infection with the parasite to become much more common and easier. Oishimaya Sen Nag, (2017) added that another leading factor can be climate change. The change in temperature, humidity level and precipitations in such areas creates a perfect climate for the breeding and survival of these mosquitoes. Proving that was a statement by the World Health Organization, (2018) where they clarified that there was an increase in number of mosquitoes after the El Nino Event in India. Traveling can cause this disease to reach countries that were safe from this P. malaria especially when the traveler is not immune to the parasite.

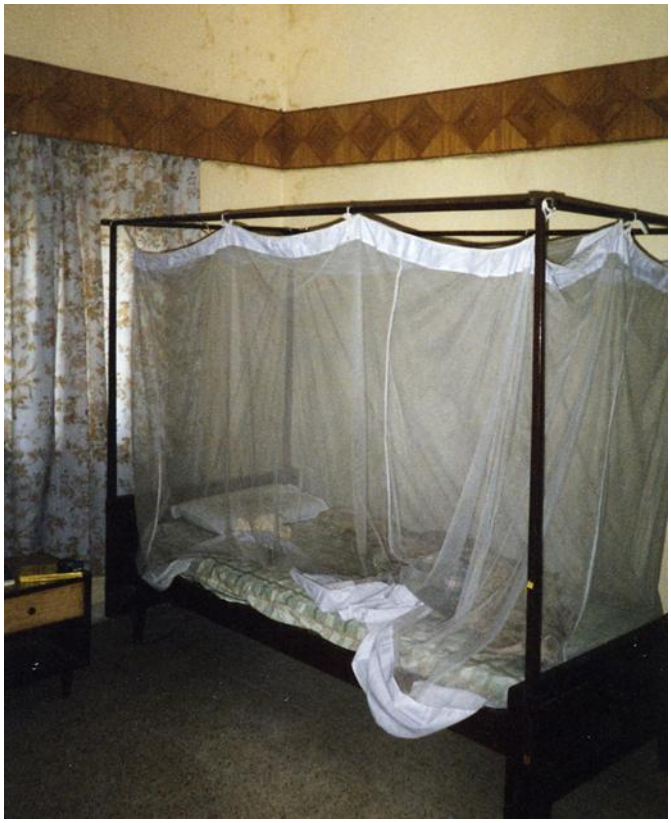

Figure 2: *Demonstrates a bed net in use.*

The Dangers of Plasmodium Malaria

The World Health Organization, (2014) reported a number of 207 million new cases and 627,000 death due to malaria infection in the world in 2012, most of whom were children of the age 5 and below. In 2016, an average of 216 million cases of malaria worldwide was recorded which resulted in an estimated 445,000 to 731,000 deaths. This is a total of 5 million more cases than in 2015. The rate of infection is expected to drop by 90% and elimination of infection cases in at least 35 countries by the year 2030 when the case was adopted by the WHO, (2014) Global Technical Strategy for Malaria 2016-2030. Liver dysfunction can be caused by Plasmodium Malaria even though it's uncommon unless the host already has a liver condition such as Chronic Liver disease or Hepatitis. This syndrome is sometimes called Malarial Hepatitis, announced Bhalla A, Suri V, Singh V, (2006). The condition is rare, but it's still an increasing occurrence in Southeast Asia and India. What makes Malaria a dangerous disease is the lack of knowledge people have regarding this parasite and the lack of awareness especially in countries of poverty such as Africa, thus, the infection rate in such places is high and increasing. In addition, the high levels of morbidity and mortality by malaria proved to Hedrick PW, (2011) that the parasite developed genetic resistance. In the book Advances in Malaria Research (chapter 13) by Jeremy N. Burrows Timothy N. C. Wells, (2016), there is an agreement that the parasite grew resistances; and it is a 21st century growing crisis in the treatment of Plasmodium Malaria, announced Shweta Sinha et al., (2014), they called it "an issue of utmost concern". Approximately half of the population lives under the risk of P. Malaria, reported by Fairhurst RM et al., (2009); Khalili MB et al., (2009) ; Mehdi NATEGHPOUR et al., (2015) respectively.

Diagnoses of Plasmodium Malaria

Malaria's symptoms mostly seem like flu, which is a reason of why individuals often don't consider visiting the doctors when the symptoms arise. In children, the symptoms are nonspecific which makes malaria harder to diagnose. To this day, a microscopical examination of the parasite is the golden method of diagnoses but in some cases further examination is required. Symptoms usually occur 10-15 after being bitten/infected with a parasite. However, in some cases the symptoms may take up to months or even a year to develop especially if prevention medications were taken during the time of infection. Possible symptoms can be abdominal pain, diarrhea and sometimes coma; but the main and most common symptoms are that similar to influenza symptoms such as fever, chills, headache, sweating, muscle aches etc. Unfortunately, inaccurate laboratory testing in 2016 and 2017 were reported which caused an over-diagnosis in countries where malaria is common, reported by Manguin et al., (2017) and Orish et al., (2016) respectively. The severity of the disease depends on the number of parasites in the blood and the type of malaria which is why P. falciparum is known to be the most dangerous type of malaria and can be fatal.

Prevention and Treatment

WHO, (2014) stated that countries that achieve elimination of the disease for three consecutive years are eligible to apply for a WHO certificate. So far countries such as United Arab Emirates (2007), Morocco (2010), Turkmenistan (2010), Armenia (2011), Maldives (2015), Sri Lanka (2016), Kyrgyzstan (2016) and Paraguay (2018) has accomplished eliminating the disease by achieving 3 consecutive years with 0 cases of local malaria infection. This proves that overcoming this threatening disease is possible and achievable.

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There are many techniques an individual can follow to reduce the risk of infection. Examples of that can be found in the book Medical Microbiology 4th edition by James M. Crutcher and Stephen L. Hoffman, (1996) Chapter 83 titled Malaria; where they stated "Exposure to night-feeding *Anopheles* mosquitoes is reduced by using protective clothing, insect repellents, insecticides, insecticide-impregnated bed nets, etc.".

Some might believe that treating symptoms such as fever can help cure or reduce the illness; a study by Meremikwu MM et al., (2012) stated that treating the symptoms doesn't affect the parasite and their effects are not clear. Yet, simple malaria can be treated orally but the most effective drugs used are antimalarial drugs known as artemisinins in combination with artemisinin-combination therapy, or ACT, while a study by Kokwaro G, (2009) said that this combination decreases any resistance to any other single drug components. A drug known as Mosquirix is known to be a partially effective vaccine for children stated by WHO (2014), thus, when used it can reduce the chances of infection amongst traveling children. Malaria can mostly be prevented or controlled by vector control, it's considered to be one of the main ways. WHO recommends vector control by insecticide treated mosquito nets and indoors spraying in any places that a mosquito can lay its eggs or come in contact with a human. Treatment of severe malaria is best done in a critical care unit where breathing rate, fevers, seizures, low blood sugar or low potassium can be monitored, stated Sarkar PK et al., (2009).

WHO, (2015) stated 4 important points that would aid managing the disease; to protect the currently available treatment of malaria against developing resistance, promoting the safe use of Malaria treatment, designing effective protocols in hospitals in the treatment of malaria with the best available evidence and to assist policy makers in creating the best and most effective national treatment policies on the basis of best available evidence.

Lastly, awareness is as important as treatment, educating people on the symptoms and treatments and preventative techniques could help cut down the percentage of infection.

REFERENCE

Amber Priona, 2017. "Countries With The Highest Rates Of Malaria"

Bhalla A, Suri V, Singh V, 2006. "Malarial hepatopathy" Journal of Postgraduate Medicine

Bledsoe GH, 2005. "Malaria primer for clinicians in the United States, Southern Medical Journal"

Fairhurst RM, Wellems TE, 2009. "Malaria In: Textbook of infectious Disease Principles and Practice of Infectious Diseases Mandell: Mandell, Douglas and Bennett, Churchill Livigstone, An Imprint of Elsevier" 7th ed

Hector Caraballo, Kevin King, 2014. "Emergency Department Management Of Mosquito-Borne Illness: Malaria, Dengue, And West Nile Virus".

Hedrick PW, 2011. "Population genetics of malaria resistance in humans" Heredity

Honigberg, 1964 and Corliss, 1967. "Systematic position" shared by Khusboo Jain "Plasmodium: Host, Habitat and Life History"

James M. Crutcher and Stephen L. Hoffman, (1996) "Medical Microbiology 4th edition, Chapter 83 Malaria"

Jeremy N. Burrows Timothy N. C. Wells, 2016. "Advances in Malaria Research, chapter 13"

Jim Gathany , 2004. " Centers of Disease Control and Prevention"

Khalili MB, Anvari Tafti MH., Sadeh M, 2009. "Epidemiological Pattern of Malarial Disease in the Province of Yazd, Iran (Since 1986–2006)"

Kokwaro G, 2009. "Ongoing challenges in the management of malaria". Malaria Journal

Laveran, A., 1880. "Note sur un nouveau parasite trouvè dans le sang de plusieurs malades atteints de fièvre palustre".

Manguin, Sylvie; Foumane, Vincent; Besnard, Patrick; Fortes, Filomeno; Carnevale, Pierre, (July 2017) "Malaria overdiagnosis and subsequent overconsumption of antimalarial drugs in Angola: Consequences and effects on human health".

Meremikwu MM, Odigwe CC, Akudo Nwagbara B, Udoh EE, 2012. Meremikwu MM, ed "Antipyretic measures for treating fever in malaria".

NATEGHPOUR, Gholamhossein EDRISSIAN, Afsaneh MOTEVALLI HAGHI,* Leila FARIVAR, and Elham KAZEMI-RAD, (2015) "Diagnosing Malaria Cases Referred to the Malaria Reference Laboratory in Tehran University of Medical Science, Iran Mehdi"

Oishimaya Sen Nag, 2017. "Is Climate Change Making Us More Vulnerable To Infectious Diseases?"

Orish, Verner N.; Ansong, Joseph Y.; Onyeabor, Onyekachi S.; Sanyaolu, Adekunle O.; Oyibo, Wellington A.; Iriemenam, Nnaemeka C., (2016) "Overdiagnosis and overtreatment of malaria in children in a secondary healthcare centre in Sekondi-Takoradi, Ghana"

Sarkar PK, Ahluwalia G, Vijayan VK, Talwar A , 2009. "Critical care aspects of malaria". Journal of Intensive Care Medicine

Shute, P. G. and M. Maryon., 1952. " A study of human malaria oocysts as an aid to species diagnosis"

Shweta Sinha, Bikash Medhi and Rakesh Sehgal, 2014. "Challenges of drug-resistant malaria". Parasite

WHO "Climate change and human health - risks and responses". Summary, retrieved 2018.

WHO, 2013. "World Malaria Report"

WHO, 2014. Malaria Fact sheet N°94

WHO, 2015. "Guidelines for the treatment of malaria" Third edition