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Review Article

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A literature review on current tropical diseases and the role of Pharmacist in public health with special reference to tropical diseases

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ABSTRACT

Tropical diseases encompass all diseases that occur principally, in this tropic. In practice, the term is often taken to refer to infectious diseases that flourish in hot, humid conditions, such as malaria, leishmaniasis, schistosomiasis, onchocerciasis, lymphatic filariasis, Chagas disease, Leprosy, and dengue etc. The World Health Organization (WHO) is providing technical support to 14 countries with persistent transmission of yaws or where the disease has reemerged as part of a renewed effort to eradicate the disease. Tropical diseases are the most common infections of the world's poorest people living in Africa, Asia, and the Americas. Occurring predominantly among people who live on below the World Bank poverty figure of US$1.25 per day. These are group of chronic parasitic and related bacterial and viral infections that actually promote poverty because of their impact on child development, pregnancy outcome, and worker productivity. Pharmacists, also known as druggists or chemists, are healthcare professionals who practice in pharmacy, the field of health sciences focusing on safe and effective medication for therapeutic uses of drugs. They are also play an important role during complete eradication of tropical diseases. National strategies for attaining health for all will normally provide for the monitoring of pharmacy manpower development and pharmacy services in the framework of health systems such as prevention and treatment of Tropical diseases. This comprehensive review article is important data base on current tropical diseases and the role of pharmacist in public health with special reference to tropical diseases.

KEYWORDS: Tropical disease, Dengue, Malaria, lymphatic filariasis, Leprosy, Pharmacist.

INTRODUCTION

Global attention to infectious disease is primarily focused on Tropical diseases. Tropical diseases are diseases that are prevalent in or unique to tropical and subtropical regions. The diseases are less prevalent intemperate climates, due in part to the occurrence of a cold season, which controls the insect population by forcing hibernation. Insects such as mosquitoes and flies are by far the most common disease carrier or vector.[1, 2] These insects may carry a parasite, bacterium or virus that is infectious to humans and animals. Most often disease is transmitted by an insect bite, which causes transmission of the infectious agent through subcutaneous blood exchange. Vaccines are not available for any of the diseases listed here, and many do not have cures. Human exploration of tropical rainforests, deforestation, rising immigration and increased international air travel and other tourism to tropical regions has led to an increased incidence of such diseases. HIV/AIDS, tuberculosis and malaria; the big three, as they are called, were responsible for over five million deaths in 2007 and are responsible for 39% of all deaths attributed to infectious disease.[3-6] Focus on the big three, as well as acute emerging and re-emerging diseases such as the Ebola virus and avian influenza, has resulted in flurry of funding, research and development, and public interest in these areas. Dengue virus belongs to family Flaviviridae, having four serotypes that spread by the bite of infected Aedes mosquitoes. It causes a wide spectrum of illness from mild asymptomatic illness to severe fatal dengue haemorrhagic fever/ dengue shock syndrome. Approximately 2.5 billion people live in dengue-risk regions with about 100 million new cases each year worldwide. The cumulative dengue diseases burden has attained an unprecedented proportion in recent times with sharp increase in the size of human population at risk.[7] Unfortunately, this attention has not extended to a group of parasitic and microbial diseases called the neglected tropical diseases (NTDs). These diseases are largely overlooked, due to their low mortality rate and the poverty of their sufferers. Neglected tropical diseases are responsible for about 534,000 deaths worldwide per year.[8] In 1975 the Special Programme for Research and Training in Tropical Diseases (TDR) was established to focus on neglected infectious diseases which disproportionately affect poor and marginalized populations in developing regions of Africa, Asia, Central America andSouth America. It was established at the World Health Organization, which is the executing agency, and is co-sponsored by the United Nations Children's Fund, United Nations Development Programme, the World Bank and the World Health Organization. TDR's vision is to foster an effective global research effort on infectious diseases of poverty in which disease endemic countries play a pivotal role. It has a dual mission of developing new tools and strategies against these diseases, and to develop the research and leadership capacity in the countries where the diseases occur. The TDR secretariat is based in Geneva, Switzerland, but the work is conducted throughout the world through many partners and

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funded grants. Some examples of work include helping to develop new treatments for diseases, such as ivermectin for onchocerciasis showing how packaging can improve use of artemesinin combination treatment (ACT) for malaria; demonstrating the effectiveness of bed nets to prevent mosquito bites and malaria; and documenting how community-based and community-led programmes to increases distribution of multiple treatments.[9]

CURRENT TROPICAL DISEASES PORTFOLIO

Now day's tropical diseases are the burning problem in the world. It may be regarded as serious a health disorders. Tropical disease that challenges not only the health care professionals but also the pharmaceutical industries as well as drug regulatory agencies. The current Tropical disease portfolio in abroad as well as in India includes the following entries.

Dengue fever:

Dengue is one of the most important mosquito borne viral diseases in the world, and is endemic in approximately 120 countries. It has been estimated that there are 50–100 million cases of dengue fever and 3.6 billion people are at risk of infection. It is emerging and re-emerging in the tropics and currently poses the most significant arboviral threat to humans.[10] Dengue fever also known as break bone fever, is an infectious tropical disease caused by the dengue virus. Symptoms include fever, headache, muscle and joint pains, and a characteristic skin rash that is similar to measles. In a small proportion of cases the disease develops into the life-threatening dengue hemorrhagic fever, resulting in bleeding, low levels of blood platelets and blood plasma leakage, or into dengue shock syndrome, where pressure occurs. Dengue is transmitted by several species of mosquito within the genus Aedes, principally A. aegypti. The virus has four different types; infection with one type usually gives lifelong immunity to that type, but only short-term immunity to the others. Subsequent infection with a different type increases the risk of severe complications. As there is no commercially available vaccine, prevention is sought by reducing the habitat and the number of mosquitoes and limiting exposure to bites. Treatment of acute dengue is supportive, using either oral or intravenous rehydration for mild or moderate disease, and intravenous fluids and blood transfusion for more severe cases. The incidence of dengue fever has increased dramatically since the 1960s, with around 50–100 million people infected yearly. Early descriptions of the condition date from 1779, and its viral cause and the transmission were elucidated in the early 20th century. Dengue has become a global problem since the Second World War and is endemic in more than 110 countries. Apart from eliminating the mosquitoes, work is ongoing on a vaccine, as well as medication targeted directly at the virus.[11-15]

Chagas disease

Chagas disease also known as mal de Chagas and American trypanosomiasis, which is a tropicalparasitic disease caused by the flagellate protozoan Trypanosoma cruzi. T. cruzi is commonly transmitted to humans and other mammals by an insect vector, the blood-sucking kissing bugs of the subfamily Triatominae (family Reduviidae) most commonly species belonging to the Triatoma, Rhodnius, and Panstrongylus genera.The disease may also be spread through blood transfusion and organ transplantation, ingestion of food contaminated with parasites, and from a mother to her fetus. The symptoms of Chagas disease vary over the course of an infection. In the early, acute stage, symptoms are mild and usually produce no more than local swelling at the site of infection. The initial acute phase is responsive to antiparasitic treatments, with 60–90% cure rates. After 4 to 8 weeks, individuals with active infections enter the chronic phase of Chagas disease that is asymptomatic for 60–80% of chronically infected individuals through their lifetime.[16] The antiparasitic treatments also appear to delay or prevent the development of disease symptoms during the chronic phase of the disease, but 20–40% of chronically infected individuals will still eventually develop life-threatening heart and digestive system disorders. The currently available antiparasitic treatments for Chagas disease are benznidazole and nifurtimox, which can cause temporary side effects in many patients including skin disorders, brain toxicity, and digestive system irritation.[17,18] Chagas disease is contracted primarily in the Americas, particularly in poor, rural areas of Mexico, Central America, and South America; very rarely, the disease has been found in the Southern United States. It is estimated that as many as 11 million people in Mexico, Central America and South America have Chagas disease, most of whom do not know they are infected. Large-scale population movements from rural to urban areas of Latin America and to other regions of the world have increased the geographic distribution of Chagas disease, and cases have been noted in many countries, particularly in Europe.[19]

Helminths

Parasitic worms, often referred to as helminths are a division of eukaryotic parasites.[20] They are worm like organisms living in and feeding on living hosts, receiving nourishment and protection while disrupting their hosts nutrient absorption, causing weakness and disease. Those that live inside the digestive tract are called intestinal parasites. They can live inside humans and other animals. Populations in the developing world are at particular risk for infestation with parasitic worms. Risk factors include inadequate water treatment, use of contaminated water for drinking, cooking, irrigation and to wash food, undercooked food of animal origin, and walking barefoot. Simple measures can have strong impacts on prevention. These include use of shoes, soaking vegetables with 1.5% bleach, adequate cooking of foods, and sleeping under mosquito-proof nets. Intestinal helminths, a type of intestinal parasites, reside in the human gastrointestinal tract. They represent one of the most prevalent forms of parasitic disease. Scholars estimate over a quarter of the world's population is infected with an intestinal worm of some sort, with roundworms, hookworms, and whipworms infecting 1.47 billion people, 1.05 billion people, and 1.30 billion people, respectively. Furthermore, the World Bank estimates 100 million people may experience stunting or wasting as a result of infection.[21] Because of their high mobility and lower standards of hygiene, school-age children are particularly vulnerable to these parasites. Overall, an estimated 400 million, 170 million, and 300 million children are infected with roundworm, hookworm, and whipworm, respectively. Children may also be particularly susceptible to the adverse effects of helminth

infections due to their incomplete physical development and their greater immunological vulnerability. Also, the immune response triggered by helminth infection may drain the body's ability to fight other diseases, making affected individuals more prone to coinfection. Reasonable evidence indicates helminthiasis is responsible for the unrelenting prevalence of AIDS and tuberculosis in developing, particularly African, countries.[22,23]

Leishmaniasis

Leishmaniasis is a disease caused by protozoan parasites that belong to the genus Leishmania and is transmitted by the bite of certain species of sand fly (subfamily Phlebotominae). Although the majority of the literature mentions only one genus transmitting Leishmania to humans (Lutzomyia) in America, a 2003 study by Galati suggested a new classification for American sand flies, elevating several subgenera to the genus level. Elsewhere in the world, the genus Phlebotomus[24] is considered the vector of leishmaniasis. During treatment there are two common therapies containing antimony and sodium stibogluconate . It is not completely understood how these drugs act against the parasite; they may disrupt its energy production or trypanothione metabolism. Unfortunately, in many parts of the world, the parasite has become resistant to antimony when treating for visceral or mucocutaneous leishmaniasis,[25] but the level of resistance varies according to species.[26] Amphotericin(AmBisome) is now the treatment of choice; its failure in some cases to treat visceral leishmaniasis (Leishmania donovani) has been reported in Sudan, but this may be related to host factors such as co-infection with HIV or tuberculosis rather than parasite resistance.[27,28]

Leprosy

Leprosy, also known as Hansen's disease (HD), is a chronic disease caused by the bacteria Mycobacterium leprae and Mycobacterium lepromatosis.[29,30] Named after physician Gerhard Armauer Hansen, leprosy is primarily a granulomatous disease of the peripheral nerves and mucosa of the upper respiratory tract; skin lesions are the primary external sign. Left untreated, leprosy can be progressive, causing permanent damage to the skin, nerves, limbs and eyes. Contrary to folklore, leprosy does not cause body parts to fall off, although they can become numb or diseased as a result of secondary infec tions. These occur as a result of the body's defenses being compromised by the primary disease. Secondary infections, in turn, can result in tissue loss causing fingers and toes to become shortened and deformed, as cartilage is absorbed into the body. Leprosy has affected humanity for over 4,000 years, and was recognized in the civilizations of ancient China, Egypt and India. In 1995, the World Health Organization (WHO) estimated that between 2 and 3 million people were permanently disabled because of leprosy at that time. In the past 20 years, 15 million people worldwide have been cured of leprosy.[31] The age-old social stigma associated with the advanced form of leprosy lingers in many areas, and remains a major obstacle to self-reporting and early treatment. Effective treatment for leprosy appeared in the late 1930s with the introduction of dapsone and its derivatives. Leprosy bacilli resistant to dapsone soon evolved and, due to overuse of dapsone, became widespread. It was not until the introduction of multidrug therapy (MDT) in the early 1980s that the disease could be diagnosed and treated successfully within the community.[32]

Filariasis

Filariasis is a parasitic disease usually an infectious tropical disease that is caused by thread like nematodes is called roundworms belonging to the superfamily Filarioidea, also known as filariae. These are transmitted from host to host by blood-feeding arthropods, mainly black flies and mosquitoes. Eight known filarial nematodes use humans as their definitive hosts. These are divided into three groups according to the niche within the body they occupy lymphatic filariasis, subcutaneous filariasis, and serous cavity filariasis. 120 million people are infected worldwide. It is carried by over half the population in the most severe endemic areas. The most noticeable symptom is elephantiasis: a thickening of the skin and underlying tissues. Elephantiasis is caused by chronic infection by filarial worms in the lymph nodes. This clogs the lymph nodes and slows the draining of lymph fluid from a portion of the body.[33] The efforts of the Global Programme to Eliminate LF are estimated to have prevented 6.6 million new filariasis cases from developing in children between 2000 and 2007, and to have stopped the progression of the disease in another 9.5 million people who had already contracted it.[34] The recommended treatment for patients outside the United States is albendazole combined with ivermectin. A combination of diethylcarbamazine (DEC) and albendazole is also effective. All of these treatments are microfilaricides; they have no effect on the adult worms. In 2003, the common antibiotic doxycycline was suggested for treating elephantiasis.[35]

Malaria

Malaria Caused by a Protozoan parasites transmitted by female Anopheles mosquitoes, as they are the blood-feeders. The disease is caused by species of the genus Plasmodium. Malaria infected an estimated 190-311 million people in 2008 and 708,000-1,003,000 died mostly in Sub-Sahara Africa. The World Health Organization has estimated that in 2010, there were 216 million documented cases of malaria. That year, between 655,000 and 1.2 million people died from the disease roughly 2000–3000 per day, many of whom were children in Africa.[36] The signs and symptoms of malaria typically begin 8–25 days following infection; however, symptoms may occur later in those who have taken antimalarial medications as prevention. Initial manifestations of the disease common to all malaria species are similar to flu-like symptoms, and can resemble other conditions such assepticemia, gastroenteritis, and viral diseases. The presentation may include headache, fever, shivering, arthralgia vomiting, hemolytic anemia, jaundice, hemoglobinuria, retinal damage, and convulsions.[37-40] Several drugs, most of which are used for treatment of malaria, can be taken to prevent contracting the disease during travel to endemic areas. Chloroquine may be used where the parasite is still sensitive. However, due to resistance one of three medications mefloquine (Lariam), doxycycline or the combination of atovaquone and proguanil hydrochloride is frequently needed.[41]

Tuberculosis

Tuberculosis, MTB, or TB is a common, and in many cases lethal,

infectious disease caused by various strains of mycobacteria, usually Mycobacterium tuberculosis.[42] Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It is spread through the air when people who have an active TB infection cough, sneeze, or otherwise transmit their saliva through the air.[43] One third of the world's population is thought to have been infected with M. tuberculosis, [44] with new infections occurring at a rate of about one per second. In 2007, there were an estimated 13.7 million chronic active cases globally, while in 2010, there were an estimated 8.8 million new cases and 1.5 million associated deaths, mostly occurring in developing countries. The absolute number of tuberculosis cases has been decreasing since 2006, and new cases have decreased since 2002. More people in the developing world contract tuberculosis because of compromised immunity, largely due to high rates of HIV infection and the corresponding development of AIDS.[45]

Onchocerciasis

Onchocerciasis or river blindness is the world's second leading infectious cause of blindness. It is caused by Onchocerca volvulus, a parasitic worm. It is transmitted through the bite of a black fly. The worms spread throughout the body, and when they die, they cause intense itching and a strong immune system response that can destroy nearby tissue, such as the eye. About 18 million people are currently infected with this parasite. Approximately 300,000 have been irreversibly blinded by it.[46-48] Treatment may involve the use of the drug ivermectin. For best effect, entire communities are treated at the same time. Since final hosts of O. volvulus are restricted to primates, it has no major animal reservoir. A single dose may kill first-stage larvae (microfilariae) in infected people, and it prevents transmission for many months in the remaining population. Other drugs are also available, including the tetracycline-class antibiotic doxycycline, which kills the Wolbachia and renders the female nematodes sterile.

African Trypanosomiasis

AfricanTrypanosomiasis, sleeping sickness, or Congo trypanosomiasis is a parasitic disease of people and animals, caused by protozoa of the species Trypanosoma brucei and transmitted by the tsetse fly. The disease isendemic in some regions of sub-Saharan Africa, covering areas in about 37 countries containing more than 60 million people. An estimated 50,000 to 70,000 people are currently infected, the number having declined somewhat in recent years.[49] The number of reported cases was below 10,000 in 2009, the first time in 50 years. African trypanosomiasis symptoms occur in two stages. The first stage, known as the haemolymphatic phase, is characterized by fever, headaches, joint pains, and itching. Invasion of the circulatory and lymphatic systems by the parasites is associated with severe swelling of lymph nodes, often to tremendous sizes. Winterbottom's sign, the tell-tale swollen lymph nodes along the back of the neck, may appear. If left untreated, the disease overcomes the host's defenses and can cause more extensive damage, broadening symptoms to include anemia, endocrine, cardiac, and kidney dysfunctions. The second, the neurological phase, begins when the parasite invades the central nervous system by passing through the blood–brain barrier. The term sleeping sickness comes from the symptoms of the neurological phase. The symptoms include confusion, reduced coordination, and disruption of the sleep cycle, with bouts of fatigue punctuated with manic periods, leading to daytime slumber and night-time insomnia. Without treatment, the disease is invariably fatal, with progressive mental deterioration leading to coma and death. Damage caused in the neurological phase is irreversible. Tryptophol is a chemical compound that induces sleep in humans. It is produced by the trypanosomal parasite in sleeping sickness.[50-52]

Schistosomiasis

Schistosomiasis also known as bilharzia, bilharziosis or snail fever is a parasitic disease caused by several species of trematodes, aparasitic worm of the genus Schistosoma. Snails serve as the intermediary agent between mammalian hosts. Individuals within developing countries who cannot afford proper water and sanitation facilities are often exposed to contaminated water containing the infected snails. This disease is most commonly found in Asia, Africa, and South America, especially in areas where the water contains numerous freshwater snails, which may carry the parasit. The disease affects many people in developing countries, particularly children who may acquire the disease by swimming or playing in infected water. When children come into contact with a contaminated water source, the parasitic larvae easily enter through their skin and further mature within organ tissues. As of 2009, 74 developing countries statistically identified epidemics of Schistosomiasis within their respective populations. Recently a field evaluation of a novel handheld microscope was undertaken in Uganda for the diagnosis of intestinal schistosomiasis by a team led by Dr. Russell Stothard from the Natural History Museum of London, working with the Schistosomiasis Control Initiative, London. Prevention is best accomplished by eliminating the water-dwelling snails that are the natural reservoir of the disease. Acrolein, copper sulfate, and niclosamide can be used for this purpose. Recent studies have suggested that snail populations can be controlled by the introduction of, or augmentation of existing, crayfish populations; as with all ecological interventions, however, this technique must be approached with caution. Schistosomiasis is readily treated using a single oral dose of the drug praziquantelannually. As with other major parasitic diseases, there is ongoing and extensive research into developing a schistosomiasis vaccine that will prevent the parasite from completing its life cycle in humans.[53-55]

ROLE OF PHARMACIST FOR PREVENTION AND TREATMENT OF TROPICAL DISEASES

The pharmacist has several functions during prevention and treatment of Tropical diseases, as follows. (1) As a communicator (2) as a quality drug supplier (3) as a collaborator (4) as a trainer and supervisor (5) as a health promoter. As a member of the health-care team, the pharmacist must participate in following programmes like Draining wetlands to reduce populations of insects and other vectors, the application of insecticides and insect repellents to strategic surfaces such as: clothing, skin, buildings, insect habitats, and bed nets, use of a mosquito net over a bed to reduce nighttime transmission, since certain species of tropicalmosquitoes feed mainly at night, Use of water wells, or water filtration, water filters, or water treatment with

water tablets to produce drinking water free of parasites, sanitation to prevent transmission through human waste, development and use of vaccines to promote disease immunity, Pharmacologic pre-exposure prophylaxis, Pharmacologic post-exposure prophylaxis, Pharmacologic treatment etc. [56-59]

DISCUSSION

Climate change, global warming caused by the greenhouse effect, and the resulting increase in global temperatures, are possibly causing various tropical diseases and vectors to spread to higher altitudes in mountainous regions, and to higher latitudes that were previously spared, such as the Southern United States, the Mediterranean area, India etc. For example, in the Monteverde cloud forest of Costa Rica, global warming enabled Chytridiomycosis, a tropical disease, to flourish and thus force into decline amphibian populations of the Monteverde Harlequin frog. Here, global warming raised the heights of orographic cloud formation, and thus produced cloud cover that would facilitate optimum growth conditions for the implicated pathogen, B. dendrobatidis etc. the larger number and variety of natural reservoirs and animal diseases that can be transmitted to humans (zoonosis), the largest number of possible insect vectors of diseases. It is possible also those higher temperatures may favor the replication of pathogenic agents both inside and outside biological organisms. Socio-economic factors may be also in operation, since most of the poorest nations of the world are in the tropics. Tropical countries like Brazil, which have improved their socio-economic situation and invested in hygiene, public health and the combat of transmissible diseases have achieved dramatic results in relation to the elimination or decrease of many endemic tropical diseases in their territory. The pharmacy profession has traditionally been focused on various activities such as dispensing and prescribing advice, health promotion, and medicines management etc .Many prevention and control programs can have a component to be implemented by community pharmacists, but only small minorities of community pharmacies are engaged in such programs. For example, a very small number of pharmacists are involved in immunisation delivery is one of the most common and fundamental preventive services. Today in public health practice, there are nagging concerns about our capacity to respond to problems like tropical diseases, pandemic diseases outbreak and widespread outbreak of disease as a result of terrorism or emergencies caused by disasters. Such scenarios would need provision of medicines and vaccinations to thousands of people over a large geographic area in a very short period of time, and is a complex undertaking requiring large number of well trained individuals. Increasing the participation of pharmacists in all levels of the public health system is fundamental to achieving substantial improvement in the health status of our population, as well as, achieving full preparedness to fight against any type of mass casualty event. [60-62]

CONCLUSION

So the Pharmacist plays a vital role for complete eradication of Tropical diseases from our country. Except above functions Pharmacist should help in Assisting with economic development in endemic regions. For example by providing microloans to enable investments in more efficient and productive agriculture. This in turn can help subsistence farming to become more profitable, and these profits can be used by local populations for disease prevention and treatment, with the added benefit of reducing the poverty rate. With professional roles of pharmacist for complete eradication of Tropical diseases from our country, a great deal of capacity is required related to new service provision as well as strategic decisions regarding educational training, professional training and redeployment, updates to practice acts and regulations, new documentation and billing systems, enhanced information exchange, collaborative practice models, infrastructure, technology, policy, and new business models. Resources are scarce, so an understanding of the most appropriate timing for making such changes can lead to cost-effective use of limited resources for improving patient care.

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