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CONTROL OF PARASITIC DISEASES

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ABSTRACT

The different approaches to control from diagnosis, to treatment and cure of the clinically sick patient, to control the transmission within the community by preventative chemotherapy and vector control are outlined. The concepts of eradication, elimination and control are defined and examples of success summarized. Failure to sustain control of parasites may be due to development of drug resistance or the failure to implement proven strategies as a result of decreased resources within the health system, decentralization of health management through health-sector reform and the lack of financial and human resources.

KEYWORDS: Control, Parasites, Vectors.

INTRODUCTION

Helminthiases are among the most important livestock and human diseases worldwide. Parasitic diseases inflict considerable socio-economic losses to society. Zoonotic parasites can result in disease manifestations in humans and substantial economic losses to livestock populations. According to the World Health Organization (WHO), over 3 billion people around the world suffer from one or more parasitic diseases, which are a leading cause of morbidity and mortality in populations.[1] Anti-parasitic drugs are effective in minimizing parasitic infections. The control of these diseases may include attempts of eradicating specific diseases at a global level, eliminating them at a national or local level, or controlling them to minimize infections. A recent literature survey of human pathogens found more than 1,400 different species, of which more than half are known to be zoonotic. Therefore, a control measures to eradicate many human and animal diseases are essential.[2] In addition, changes in public health policy, drug resistance, social pattern changes, and genetic mutations in pathogens have led for many emerging and re-emerging diseases such as *Cryptosporidium* species. In addition, global warming has caused climate changes, disrupting the biodiversity of various species that depend on a proper ecosystem. Global warming can alter the geographic distribution and intensity of the transmission of vector-borne diseases. The transmitted parasites usually benefit from increased temperatures as both their reproduction and development are accelerated.

Objectives

The principle aims and expected outcomes of the control are

1. To provide anthelminthic chemotherapy for 95% of people.
2. TO reduce the frequency of severe complications, including iron-deficiency anemia and mortality.
3. To decrease the harmful effect of infections on the growth, development and education achievement.
4. To decrease the egg or trophozoite output among highly infected patients.
5. To decrease the prevalence of infection among people living in endemic areas.
6. To decrease the reinfection rates in the community.

The control measures

I) Chemical treatment

It refers to use the anthelminthic drugs to reduce the prevalence of parasitic diseases in endemic region. Mass treatment interrupts parasite life cycles but does not halt them completely, and the risk for reinfection is high.[3,4] Endemic areas require a number of public health measures beyond chemotherapy, including safe drinking water, basic sanitation, health education and a good nutrition.[5]

By using some insecticides and acaricides. some resistant species were noticed among some flies and mosquitoes. The insecticides should be changed every 4-5 years. The application of non-volatile oil on the water surface which lead to death of mosquitoes' larvae by asphyxia.

Immunocompromised should be anticipated in order to give the proper treatment at the early time and reduce the suffering often faced by those patients.

Well-nourished patients would develop less complications than mal-nourished people.

Infection due to soil-transmitted helminths has been associated with morbidity including delays in growth and cognitive development, particularly among children 2 to 12 years of age (1,6-8). Population deworming may be effective in reducing the prevalence of infection.[9] the degree of benefit depends on patient characteristics, regional parasite species, and burden of infection.

The data on efficacy for population deworming are mixed; overall, the evidence demonstrates that children with helminth infections have diminished growth rates compared with uninfected children. The greatest benefit of deworming appears to be among young children.[10-14]

There has been a dramatic increase in the use of mass drug administration to reduce the morbidity associated with helminth infections of humans and animals. But anthelmintic resistance may become a public health concern of the future. Control campaigns have been against the filarial parasites which cause human on chocerciasis and lymphatic filariasis. The molecular and parasitological evidence suggesting the presence of drug resistance in human filarial parasites and hookworms.

The application of chemical molluscicides remains one of the most efficient methods of snail control.[15] Copper sulfate, sodium pentachlorophenate, N-tritylmorpholine, and niclosamide (Bayluscide) were widely used from the 1950s to 1970s to control snails, especially to control schistosomiasis in Asia, Africa and South America.[16] In China, remarkably, no clear evidence has emerged regarding snail resistance after extensive and prolonged niclosamide application for over 20 years.[17] In addition, it is more stable, more effective and less toxic.[18] These molluscicides can be more useful than other snail control methods in areas endemic for schistosomiasis.[15,18]

Many plant extracts are potential molluscicides, less toxic and are less likely to cause snails to develop resistance,[19] Many plant products have shown to be effective. For example, solvent extracts of fresh, mature *Solanum nigrum* leaves and species of the genus *Atriplexinflate* against *Biomphalaria alexandrina* and mosquitoes.[19,20]

How deworm school-age children

First of all, you need the tablets, drinking water, forms to register the children treated and weighing scale.

1. Ask all the children to stand in a queue.
2. Register the name of each child.
3. Give one tablet to every child.
4. Provide water and make sure that every child swallows the tablet(s).

II) Physical control

Physical control measures aim at reducing snail populations through environmental management. For example, eliminating natural water bodies (such as marshes and ponds) and regulating human settlement in areas of risk are efficient measures. Elimination of mosquitoes breeding places as stagnant water or small collection of water by filling with earth. Screening of houses windows and doors by net and sleeping inside bed net. Sun light, ventilation, excess heat or cold are useful in limiting development of arthropods and molluscs

III) Biological Control

A suitable alternative to the growing problem is the usage of natural enemies. There are several methods through which biological control of parasites could be achieved, including the use of predators (such as arthropods, mites, flies, beetles, amphibians, fish, birds, rodents, etc.).

The predatory prawns (*Macrobrachium vollenhoveni*) prefer to consume snails infected with schistosomes, and young and growing prawns kill snails most efficiently.[21,22] The water bug, *Sphaerodema urinator*, shares a common habitat with freshwater snails and has been used to control host snails that transmit schistosomiasis. The black carp, *Mylopharyngodon piceus*, is a noteworthy predator of snails that are intermediate hosts of *C. sinensis* and *O. viverrini*. have been used successfully as biological controls in different regions of the world. It has been confirmed that larvivorous fish, frogs, ducks and a certain insects are efficient to consume the aquatic stages (larva and pupa) of mosquitoes. Dragon, flies, frogs, lizards, spiders, bats and some birds like to eat adult mosquitoes and thus it can be applied as a control measure for malaria.

IV) Planned engineering projects

Some projects as water supply, sanitary sewage, sanitation, improved practices in agriculture and animal breeding are vital as a control measure. In some areas, proper drainage and environmental engineering have also decreased *Schistosoma haematobium* and *Schistosoma japonicum* transmission.[24]

Human stool should not be used as fertilizer in agriculture unless it is either exposed to the direct sun light or treated with some chemical as Sod. Chloride, Lysol. Am. Nitrate, Am sulphate and Sod. Nitrate in order to kill the parasitic stages (egg, trophozoite, cyst and larva). The usage of cloves and shoes in agriculture are beneficial. Clean standard ration and water must be provided for livestock. Eradication of rodents in the animal farm. Proper meat inspection. The infected carcasses and organs should be burned or buried. Killing of stray dogs and cats while in contrast, treatment of domestic dogs and cats should be done.

V) Mechanical control

Hand-catching *Tse tse* flies (vector for trypanosomiasis), rapping *Anopheles* (vector for malaria), clearing wild grass (typhus), lining the irrigation canal with cement concrete to prevent growth of aquatic vegetation essential for growth of snails.

VI) Control by sterilization

Sterilization either by Irradiation or using chemosterilants is useful to control the breeding of male vectors and consequently, it would minimize the transmission of the disease.[25]

VII) Genetic control

The acquisition and expression of immunity against gastrointestinalnematodes is genetically controlled and variesbetween breeds and between individuals of the same breed.[26,27] as well as genotype vs. environment interactions. Insusceptibility of West African and American blacks to vivax malaria in comparison to other racial groups is another indication for genetic properties.[28] Improvement of genetichost resistance to infection, can lead to a reduction in clinical signs of disease and transmission will be impacted.

Injection of antigen in the unexposed area of the skin would lead to life-long lasting immunity against cutaneous leishmaniasis.

Vaccine development will be of great achievement in controlling some parasitic diseases such as malaria and leishmaniasis.

There are many genetic methods as hybride sterility, cytoplasmic incompatibility, meiotic drive, distorted sex ratios and chromosome translocations which can be applied but they are so expensive.

CONCLUSION

Parasitic diseases remain highly prevalent worldwide and have substantial deleterious impacts on human health, predominantly in tropical and sub-tropical areas. Consequently, breaking the disease transmission cycle by controlling host snail and vector populations is an alternative method of reducing the spread of such diseases due to the lack of clinically effective vaccines and potential parasite resistance to the currently available anthelmintic drugs.

Control measures could be applied at the level of individual, community, national and international. The individual level includes treatment, education and personnel hygiene while the community level would involve water supply, sanitary disposal of human excreta, eradication of intermediate hosts (arthropods and snails) and mass chemotherapy. However, national and international control would be by the involvement of WHO.

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