REVIEW ARTICLE

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Helminthiasis: a review of articles

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INTRODUCTION

Helminthiasis is an infectious disease caused by intestinal parasites that affect people and are usually caused by *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms, such as *Ancylostoma duodenale* and *Necator americanus*[2]. Distributed all over the world, it affects men and animals. These parasites occur in Asia, Europe, Africa, and the Americas. Considered a third world country disease and neglected, by lack of basic sanitation, climate change, international travel, migration flows, resistance to chemotherapy if treated ineffectively tend to evolve to chronicity and incurability[3,4]. They cause abdominal pain, nausea and vomiting, heartburn, diarrhea, and gastric ulcerative lesions, and colonization by *Helicobacter pylori*. Complementary endoscopic examinations are very useful in diagnostic confirmation[3]; however, there are faster and less honorable ways to identify the infection.

According to experts, parasitosis is the most widespread disease in the human and animal population. Human pathogenesis appears to be related to the parasite strain, host immune resistance, and acquired infection form[1].

With the use of chemotherapy for organ and bone marrow transplantation, and, with the onset of acquired immunodeficiency syndrome, the incidence of opportunistic infection by parasites has increased[3].

Neutrophils

Neutrophils are the most abundant white cell circulation population and the main cell type in acute inflammatory reactions. Neutrophils circulate as a spherical cell approximately 12–15 μm in diameter with numerous membranous projections. The core is segmented into three to five connected lobes (Figure 2-1A). Because of their nuclear morphology, neutrophils are also called polymorphonuclear leukocytes (PMNs). The cytoplasm contains two types of membrane-bound granules. Most of these granules, called specific granules, are full of enzymes such as lysosome, collagenase, and elastase. These granules do not contain strong colors with acid or basic dyes (hematoxylin and eosin, respectively), with neutrophils distinct from two other types of leukocyte strain circulation with cytoplasmic granules, called basophils and eosinophils[6].

The greatest function of neutrophils is phagocyte microbes, especially opsonized microbes, and necrotic cell products destroy these phagolysosomes. In addition, neutrophils produce fatty contents and antimicrobial substances that kill extracellular microbes and can also damage healthy tissues[6].

An effective treatment against parasitosis is vermifuge during the acute and chronic phases of the disease.

The medicines used are:

- Albendazole;
- Mebendazole.

MATERIALS AND METHODS

This review of articles was carried out in June 2021. The following databases were used: SciELO (CrossRef), Directory of Open Access Journals (DOAJ), Scopus (Elsevier), Materials Science and Engineering Database, and ScieELO Public Health from 1967 to 2012. The descriptor used was: "Helminthiasis".

Table 1 shows the eligibility criteria for the studies, defined in the search process.

The selection of studies was performed by the independent researcher (Viza Jr, G. de A.), including the analysis of titles and abstracts and reading of the full texts. Disagreements were resolved by rereading. The extraction and systematization of the results were performed using Microsoft Excel® and Microsoft Word® software. The results were organized in order to meet the following objective: the review of Helminthiasis articles.

RESULTS AND DISCUSSION

The electronic search returned 20 articles; 19 were excluded after analyzing the titles and abstracts for not covering the topic addressed. At this stage of the study, one eligible article remained, which was included in the review (Figure 1).

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Table 1. Inclusion and exclusion criteria adopted in this review.

Inclusion	Exclusion
Helminthiasis studies Parasitology Worm Articles in Portuguese, English and Spanish from 1967 to 2012	Theses, dissertations, technical reports, exclusive cell studies, reviews, book chapters, editorials, letters to the editor and newspaper articles

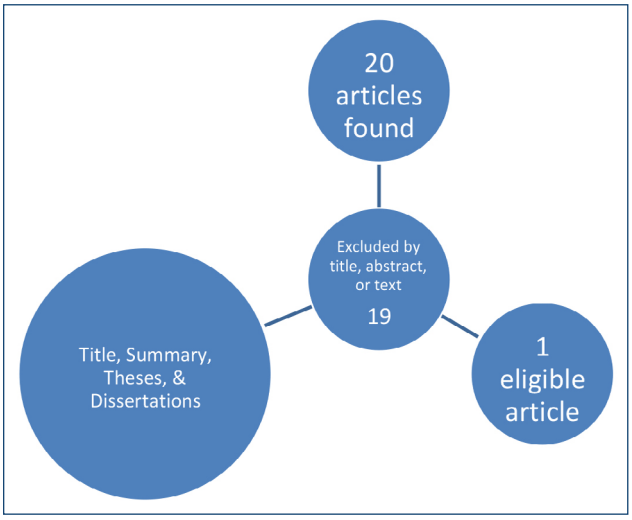

Figure 1. Diagram of the selected articles.

PASSIVE IMMUNIZATION

Passive immunization is achieved by transferring antibodies produced from the animal or human to the child. This type of immunity produces a quick and efficient protection, which, however, is temporary, lasting on average a few weeks or months.

Passive immunization can be defined as the administration of antibodies to a recipient, with the aim of providing immediate protection against a microbial agent, a toxic substance, or a cell[7].

Natural passive immunity is the most common type of passive immunity, characterized by the passage of antibodies from the mother to the fetus through the placenta.

Premature newborns, especially those considered extremely premature, have invariably low maternal immunoglobulin (IgG) levels, reaching the levels of only 100 mg/dL in the first month of life[5].

Passive immunization is generally indicated in cases of:

- Congenital and acquired immunodeficiencies;
- Susceptible individuals exposed to certain diseases;
- When the weather does not allow adequate protection through active immunization alone;
- Certain diseases, whether the administered antibody can suppress the action of a toxin (i.e., botulism, diphtheria, tetanus) or the inflammatory response (Kawasaki disease).

With the advancement of scientific techniques and in the field of immunology, several types of products are currently used in passive immunization:

- Standard IgG, available in intramuscular and intravenous form (IVIG);
- Hyperimmune IgG (specific);
- Animal serums and antitoxins;
- Monoclonal antibodies.

Monoclonal Antibodies (mAbs): These are antibodies produced by a single clone of a parental B lymphocyte and are, therefore, identical with respect to their physicochemical and biological properties.

These mAbs can be generated in the laboratory to recognize and bind to an antigen of interest, thus enabling passive immunization.

This procedure was first described, in an article published in the journal Nature by scientists César Milstein and Georges Köhler in 1975. For this feat, both shared the Nobel Prize for Medicine in 1984 with the Dane Niels Kaj Jerne (Figure 2).

Passive immunization is not always effective, and the duration varies from 1 to 6 weeks. Side effects exist in all forms of administration, and precautions must be taken especially when using the products of animal origin.

Active immunization: A protein or a polysaccharide that is not produced by an individual and enters your body via the parental (non-digestive) route, even if they do not harm you, is recognized as antigens that will produce a protein capable of inactivating and/or destroying the invader (antibody).

Lymphocytes, a type of white blood cell, and plasmocytes, a defense present in the connective tissue, produce antibodies that will fight the antigens.

By recognizing the antigen and producing the antibodies, the body builds an immunological memory in the form of "memory cells," which will recognize and coordinate the production of specific antibodies against the specific antigens. The organism keeps the way in its immunological memory the way to prevent a new invasion by the same pathogenic agent.

This mechanism can be classified as active immunization when the body produces its own antibodies. It is a slow but long-lasting process that can sometimes last a lifetime.

Source: http://www.gettyimages.com/

Figure 2. César Milstein and Georges Köhler receiving the Nobel Prize.

Active immunity can be defined as the protection provided by antigenic stimulation of the immune system with the development of a humoral (antibody production) and cellular response. This stimulation can occur by natural infection or by using a vaccine.

"Vaccination is the deliberate exposure, by injection, ingestion, or inhalation of a nontoxic product that stimulates the individual to produce antibodies"[8].

Active natural immunization: Every organism at birth is exposed to several host microorganisms and has to control a microbial invasion in a short period of time. The immune system takes some time to become functional, and the full development of immune capacity depends on antigenic stimulation.

Organisms are susceptible to infections within the first few weeks of life. Antibodies and possibly maternally acquired T cells (passive immunity) are essential in the first week of life.

The diverse range of T-cell receptors (TCR) and the production of cytokines are limited in the neonate, due to little exposure to foreign antigens. As the organism comes into contact with agents that are foreign to its natural microbiota, it starts to develop an immune response that will, in the future, serve as protection against those same agents. This process is called active natural immunization.

LIMITATIONS

This review proposes an analysis of Helminthiasis cases, but a limitation must be considered. Our sampling frame was based on a specific number of databases. Thus, some articles may not be retrieved due to the limitations applied in the search, as well as limitations in the algorithms adopted in the search interface of each database.

These aspects directly affect the sensitivity and specificity of the research strategy, which may have helped to identify important articles. As a strategy to minimize, all articles that are not limited to database or keywords were screened.

FINAL CONSIDERATIONS

This review strengthens the understanding of the potential use of vermifuge for the development of therapies for Helminthiasis.

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REFERENCES

1. Machado PRL, Araújo MIAS, Carvalho L, Carvalho EM. Mecanismos de resposta imune às infecções. An Bras Dermatol. 2004;79(6):647-62. https://doi.org/10.1590/S0365-05962004000600002
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Guia Prático para o Controle das Geo-helmintíases [recurso eletrônico] / Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância das Doenças Transmissíveis. Brasília: Ministério da Saúde; 2018. p. 33. https://bvsms.saude.gov.br/bvs/publicacoes/guia_pratico_controle_geohelmintiases.pdf. ISBN 978-85-334-2622-1.
3. Neves DP, editor. Parasitologia humana. 11th ed. São Paulo: Editora Atheneu; 2005.
4. Murray PR, Rosenthal KS, Pfaller MA. Microbiologia Médica. 5th ed. São Paulo: Editora Elsevier; 2008. p. 992.
5. Ballow M, Cates KL, Rowe JC, Goetz C, Desbonnet C. Development of the immune system in very low birth weight (less than 1500 g) premature infants: concentrations of plasma immunoglobulins and patterns of infections. Pediatr Res. 1986;20(9):899-904. https://doi.org/10.1203/00006450-198609000-00019
6. Abbas AK, Lichtman AH, Pillai, S. Cellular and molecular immunology. 9th ed. Philadelphia, PA: Editora Elsevier; 2018.
7. Tavares EC, Ribeiro JG, Oliveira LA. Imunização ativa e passiva no prematuro extremo. J Pediatr (Rio J). 2005;81(1 Suppl. 1):S89-94. https://doi.org/10.1590/S0021-75572005000200011
8. Luz, KR, Souza, DCC, Ciconelli, RM. Vacinação em pacientes imunossuprimidos e com doenças reumatológicas auto-imunes. Rev Brasil Reumatol. 2007;47(2):106-113. https://doi.org/10.1590/S0482-50042007000200005.