Homeopathy in parasitic diseases

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ABSTRACT

Background: The use of homeopathic medicines has increased, partly because conventional drugs do not always elicit the desired effects, and partly because their side effects might compromise the patient's adherence to treatment. Several studies showed benefits in the use of highly diluted medicines for the treatment of infectious diseases. **Aim:** The aim of the present review was to perform a critical discussion about aspects of homeopathy and the current status of veterinary experimentation, as well as of the use of highly diluted drugs in infectious and parasitic diseases. The main aspects of effects, therapeutic regimens and / or dynamizations used in various models are discussed. **Methods:** Articles published since 2000 in journals included in databases PubMed and SciELO and specialized journals sought for and reviewed using keywords "parasitic diseases/homeopathy" and "parasitic diseases/ ultra-dilutions". **Results:** Several recent experimental studies demonstrated the biological effect of highly diluted medications on parasitic infections, with reduction of the number of parasites and improvement of the clinical condition of the affected animals. Several articles exhibit problems in the description of methods, which threaten the reproducibility of experiments. **Conclusion:** The acknowledgment of homeopathy depends on the credibility of investigators. Although research on homeopathy has clearly increased in recent years, relative to both implementation of more consistent methods and description of data and methods, improvement is still required. Precise and detailed descriptions will contribute to advance the use of homeopathy, so that society at large might benefit in actual practice,.

Keywords: homeopathy, parasitic infections, CAM (complementary and alternative medicine).

Introduction

Homeopathic medicines, ultra-diluted or ultra-molecular compounds, and "dynamized" systems are synonyms used to name preparations that are manipulated in compliance with the homeopathic pharmacopeia[1]. According to the latter, homeopathic medicine is "any form of pharmaceutical dispensation administered in accordance with the principle of similarity and/or identity, with curative and /or preventive purposes. Homeopathic medicines are prepared by means of the dynamization technique and [might be indicated] for internal or external use".

The homeopathic literature mentions a wide variety of medicines, including so-called "constitutional medication", "isotherapeutic agents", "nosodes", "sarcodes", "organotherapeutic agents", and so forth, all of them prepared according to the homeopathic pharmacopoeia, the concentration of which may or not exceed Avogadro's number.

The connection between homeopathy and parasitology dates from the 18th century, ever since Christian Friedrich Samuel Hahnemann (1755-1843), considered as the “father of homeopathy”, self-administered *Cinchona officinalis*, a substance used at the time for the treatment of malaria. In this experiment, Hahnemann observed that the symptoms elicited by this substance on him were similar to the ones of malaria. Based on those observations, Hahnemann established the principles that define homeopathy and that differ from the ones of conventional medicine, to wit: therapeutic similarity (*similia similibus curentur*), which means that diseases can be treated with substances that elicit symptoms similar to the ones of the disease to treat; use of infinitesimally diluted doses; compliance with the patient’s individuality; and in systemic approach to treatment [2].

Such integrated notion refers to the one of organic homeostasis, which is altered in parasitic diseases as a reflect of the imbalance in the parasite-host relationship, which must be balanced to benefit the host.

The use of homeopathic medicines has increased, partly because conventional drugs do not always elicit the desired effects, and partly because their side effects compromise the patient’s adherence to treatment.

A frase abaixo ficou sem sentido! Por favor, reescrever!

For infectious agents in general, many reports can be found in the literature. According to some authors [3-7], the clinical use follows the same pattern, including worldwide and national policies to increase their use [8,9].

In agriculture and cattle-farming, the advances in the use of homeopathy are well established. In some countries, national policies [10] include the use of homeopathic medicines in systems of organic productions [11].

In regard to fundamental research in parasitology, several experimental models based on the induction of infection/infestation by parasites have been established. These models are excellent tools to evaluate the efficacy and mechanism of action of new medicines in both mass or either mass or highly diluted doses.

The aims of the present study was to perform a systematic review about aspects of homeopathy in parasitic diseases, to evaluate the use of highly diluted drugs in parasitic infections and the main aspects of effects, therapeutic regimens and / or the dynamizations used in various models.

Methods

For the purpose of the present review, a survey of articles published from 2000 onwards was conducted in journals included in database PubMed/Medline and SciELO. We also looked for studies published in conference annals. The keywords used were “parasitic diseases/homeopathy” and “parasitic diseases/ultra-dilutions”, in English and Portuguese.

Specialized journals such as Homeopathy, International Journal of High Dilution Research, and Brazilian Homeopathic Journal were also used. The content of each issue of these journals was surveyed for articles that addressed subject "use of highly diluted medication in parasitic infections".

The articles were entered in tables according to subject: use of homeopathic medicines in used to treat arthropod infestations; use of homeopathic medicines in the treatment helminthiasis; and use of homeopathic medicines in the treatment of diseases caused by protozoa.

.The studies were further subjected to critical analysis based on criteria formulated for fundamental research in homeopathy[12] and listed in REHBaR [13].] to help investigators plan experiments and present their results.

Results

Almost 50 articles were screened and assessed for eligibility, and 39 were included in the present review. The articles that did not comply with the criteria applied, as e.g.,as year of publication, were excluded. The results of the included studies are presented in tables that include the relevant data and citation.

Highly diluted medications for treatment of parasitic diseases

Several recent experimental studies demonstrated the biological effect of highly diluted medications on parasitic infections (Tables 1-3). Parallel to such scientific studies, the practical application of homeopathic products to veterinary medicine, especially in cattle farming, has recently consolidated. Currently, homeopathic products are used in animal husbandry worldwide, due to their benefits in the control of diseases, including endo- and ectoparasites, as well as to improve the animals' productivity in an environmentally safe manner [3,4,14,15].

Similarly, also in the use of homeopathic products has been shown to improve productivity and the control of insects and plagues without causing environmental impacts, thus contributing to sustainable development and environmental protection as a whole[16].

Table 1: Use of homeopathic medication to treat arthropod infestations

PARASITE	MEDICATION* (POTENCY)	ANIMAL MODEL (AGE)	TREATMENT REGIMENS	EFFECT	REFERENCE
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Factor C&MC* Biotherapeutic 12CH (10 ⁻¹²)	bovine (different ages)	400g mixed with the mineral salt <i>ad libitum</i> for 24 months.	↓ number of parasites	Arenales and Coelho, 2002
<i>Dermatobia</i> <i>hominis</i>	Isotherapeutic 12DH (10 ⁻¹²)	bovine (age not provided)	Mixed with the mineral salt (<i>ad libitum</i>) for 35 days.	↓ size of lesions Interrupted the life-cycle of the parasite.	Fonseca and Goloubeff, 2006
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Factor C&MC* Biotherapeutic 12CH (10 ⁻²⁴)	bovine (360-420 days old)	1.6g/animal/ day mixed with the mineral salt (<i>ad libitum</i>).	↓ number of parasites	Silva <i>et al.</i> , 2008
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Biotherapeutic 12CH (10 ⁻²⁴)	bovine (age not provided)	Mixed with the mineral salt (<i>ad libitum</i>) for 6 months.	↓ number of parasites ↓ size of the parasites	Gazim <i>et al.</i> , 2010
	Biotherapeutic 30CH (10 ⁻⁶⁰)		Beginning of treatment – 6 months after Biotherapeutic 12cH on alternate days.		
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Factor C&MC* Biotherapeutic 12CH (10 ⁻¹²)	bovine (age not provided)	5g mixed with the mineral salt <i>ad libitum</i>	↓ number of ectoparasites ↓ number of intestinal parasites ↓ eggs/g of feces	Signoretti <i>et al.</i> , 2010
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Biotherapeutic 12DH (10 ⁻¹²)	bovine (age not provided)	2mL mixed with the mineral salt for six months.	<i>Dermatobia hominis</i> ↓ number of parasites equivalent or in comparison to the to the conventional treatment.	Deffune and Oliveira, 2011
<i>Dermatobia</i> <i>hominis</i>	Biotherapeutic 12CH (10 ⁻¹²)		Biotherapeutic 12 CH 2mL/ mixed with the mineral salt/ after the use of Biotherapeutic 12DH for 6 months.	<i>Boophilus microplus</i> ↓ number of parasites More effective than the conventional treatment.	
<i>Rhipicephalus</i> (<i>Boophilus</i>) <i>microplus</i>	Factor C&MC* Biotherapeutic 12CH (10 ⁻²⁴)	bovine (180-240 days old)	20g/ day / pre infection.	↓ number of parasites	Costa Júnior and Furlong, 2011

Factor C&MC®: Biotherapeutic complex*: *Boophilus microplus*, *Amblyomma cajennense*, *Haematobia irritans*, *Musca domestica*, *Bunostomum* sp, *Haemonchus contortus*, *Haemonchus placei*, *Nematodirus* sp, *Oesophagostomum* sp, *Strongyloides* sp, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichuris* sp, *Eimeria* sp, *Cysticercus cellulosae*, *Dermatobia hominis*, all in 12cH

Table 1 lists articles [17-23] involving the use of homeopathic medication for treatment of arthropod infestations. In the treatment of cattle infestations by *Rhipicephalus (Boophilus) microplus*, use of biotherapeutic medications has shown interesting results, such as reduction of the parasites' size and interruption of their biological cycle, with consequent reduction also of parasites' number [17-23], sometimes even exceeding the effects observed with conventional treatment.

Biotherapeutic treatment of cattle infested with *Dermatobia hominis* also exhibited satisfactory results, including reduction of the parasites' number and of the size of lesions. Those findings are suggestive of balance in the parasite-host relationship during the period of infestation [18,22].

Those studies showed that neither the medicine dose, nor the animals' age seem to influence the results, thus agreeing with the authors who observed that although the frequency of administration is a relevant factor, the actual dose used is not [24,25]. Those animals received the medication mixed in the food, *ad libitum*, which indicates that continuous stimulation seems to afford satisfactory outcomes.

Aleixo *et al.* [26-29] found similar the same results in experimental studies conducted with mice infected by *Trypanosoma cruzi* in the acute phase. The groups subjected to continuous treatment with a biotherapeutic agent over a long period of time exhibited better response compared to the ones subjected to shorter treatment or with a single daily dose. Once again, the relevance of the stimulus frequency is highlighted.

Table 2: Utilization of homeopathic medications in helminthiasis.

PARASITE	MEDICATION* (POTENCY)	ANIMAL MODEL (AGE)	TREATMENT REGIMENS	EFFECT	REFERENCE
<i>Oesophagostomum sp</i>	<i>Phosphorus</i> 6CH (10 ⁻¹²)	bovine (120-210 days)	Mixed with the mineral salt (<i>ad libitum</i>) for 30 days.	↓ number of parasites Clinical improvement	Almeida and Pinto, 2002
<i>Trichinella spirallis</i>	<i>Podophyllum TM</i> <i>Cina</i> 30CH (10 ⁻⁶⁰) <i>Santonin</i> 30CH (10 ⁻⁶⁰)	murine (age not provided)	60mg/kg/day /animal/ V.O from the 7th day of infection for 120 days.	↓ number of larvae	Sukul <i>et al.</i> , 2005
<i>Oesophagostomum sp</i> <i>Haemonchus contortus</i> <i>Trichostrongylus sp</i> <i>Cooperia spp</i>	Complex: Factor VERM (formule not presented)	ovine (540 days)	Mixed with the mineral salt, 1,6g/day/ animal, <i>ad libitum</i> .	No ↓ eggs/g of feces Not clinically evaluated	Rocha <i>et al.</i> , 2006
Nematodes	Complex: <i>Sulphur</i> 30DH (10 ⁻³⁰) <i>Ferrum phosphoricum</i> 6DH (10 ⁻⁶) <i>Arsenicum album</i> 6DH (10 ⁻⁶) <i>Mercurus solubilis</i> 6DH (10 ⁻⁶)	ovine (150 days)	10 drops 2 times a day/ diluted in water administered <i>ad libitum</i> .	No ↓ eggs/g of feces ↓ symptoms of intestinal parasitoses	Cavalcanti <i>et al.</i> , 2007
<i>Giardia muris</i>	<i>Allium sativum</i> <i>Arsenicum album</i> <i>Carduus marianus</i> (potency not presented)	murine (28 days)	100 drops/L diluted in water administered <i>ad libitum</i> for 50 days.	↓ number of parasites ↓ eggs/g of feces	Silva <i>et al.</i> , 2007a
<i>Haemonchus contortus</i>	<i>Ferrum phosphoricum</i> 6DH (10 ⁻⁶)	ovine (135 days)	Administered in alternate days for 10 days.	↓ number of larvae Improvement of the biochemical aspects Improvement of the immunological aspects	Zacharias <i>et al.</i> , 2008
	<i>Arsenicum album</i> 6DH (10 ⁻⁶)		Administered in alternate days for 10 days.		
	<i>Calcarea carbonica</i> 12DH (10 ⁻¹²)		Administered after 10 days from the beginning of the treatment, for 10 days (2x/day)		
<i>Oesophagostomum sp</i> <i>Haemonchus contortus</i> <i>Trichostrongylus sp</i>	Complex: Factor VERM (formule not presented)	caprine (365 days)	Mixed with the mineral salt, 1,6g/day /animal, <i>ad libitum</i> , for 18 months.	No ↓ eggs/g of feces Not clinically evaluated	Chagas <i>et al.</i> , 2008
Nematodes	Complex: VERM 100 (formule not presented)	ovine (180-1080 days)	Mixed with the mineral salt 10g/ animal/ day, administered <i>ad libitum</i> .	No ↓ eggs/g of feces ↓ symptoms of intestinal parasitoses	Andrade <i>et al.</i> , 2011

Table 2 lists articles [3,5,21,23,30-35] involving the use of homeopathic medication for treatment of helminthic infections [5,30-33]. The table also lists experimental studies [19,32].

In this case, the classical homeopathic medicines are chosen based on the so-called "epidemic genus", which consists in the identification of the set of symptoms common to a group of ill animals, which is used to select the appropriate medicines based on the principle of therapeutic similarity. These cases showed interesting results, as the parasite load remained steady, while the symptoms showed remission, leading to the hypothesis of "return to homeostasis," in which balance is established in the parasite-host relationship [5,19,30-34].

Also in those studies, application of constant stimulus, which was achieved by mixing the medication mixed to the food, seemed to be more significant than the medication dose. As Table 2 shows, that pattern was detected also when biotherapeutic medications were used.

Studies conducted with protozoan parasites and well-known experimental models provided relevant clues for the understanding of the mechanism of action of homeopathic medicines. Table 3 summarizes the results of experiments involving infection by protozoan parasites.

In one experimental study, a group of mice was treated with biotherapeutic of *Toxoplasma gondii* in high dilution before induction of infection. The progression of infection exhibited a pattern different, and the clinical condition of that group was better, with fewer eye lesions, in that group compared to the controls [36].

In human beings, cases of ocular toxoplasmosis treated with homeopathic medications selected based on repertory analysis of symptoms showed satisfactory outcomes, with improvement of the visual acuity and of the general state of patients[37]. In mice and rats naturally infected with coccidian parasites[35], the use of a homeopathic complex consisting of *Allium sativum*, *Carduus marianus* and *Arsenicum album* eliminated the infection in the mice and decreased the number of cysts eliminated by the rats. It is worth to observe that the authors did not report the potency used.

Studies using a model of experimental infection of mice by *Trypanosoma cruzi* found that highly diluted medications affected the host's immune balance. Variables such as frequency of administration, medication potency, medication selection and their combinations are of great relevance.

The variables studied are many: parasitemia, mortality, survival time and blood and immune parameters [26,38-41]. One study reported increase of the apoptosis index and decrease of the TGF- β concentration in the serum of the group of animals treated with a biotherapeutic medication, compared to the control group [40].

The conclusions of studies that employed models under carefully controlled experimental conditions exhibited the same pattern as the one found in the treatment of farm animals, which showed promising clinical results, where, even when the experimental conditions were not fully controlled. In both cases, animals subjected to long and continuous treatment exhibited better outcomes compared to the ones treated for shorter periods of time or received one single daily dose.

Table 3: The utilization of homeopathic medications in protozoosis.

PARASITE	MEDICATION* (POTENCY)	ANIMAL MODEL (AGE)	TREATMENT REGIMENS	EFFECT	REFERENCE
<i>Leishmania amazonensis</i>	Complex: Canova*	murine (28 days) <i>in vitro</i>	0.2mL/ gavage Subcutaneous administration for 9 days.	↓macrophages infection index . ↑NO	Pereira <i>et al.</i> ,2005
<i>Trypanosoma cruzi</i>	Biotherapic 30DH (10 ⁻³⁰)	murine (28 days)	Treated 8 days before the infection for 7 days, 50 uL/day. Treated after the infection 50 uL/day for 7 days.	↑survival rate ↑IgG	Queiroz <i>et al.</i> ,2006
<i>Plasmodium berghei</i>	<i>Eupatorium perfoliatum</i> 30CH (10 ⁻⁶⁰) <i>Arsenicum album</i> 0/6	murine (42-56 days)	8µL/ 200 µL/ every 24 hours for 9 days through gavage	↓schizogony ↓número de schizonts	Lira-Salazar <i>et al.</i> ,2006
<i>Babesia gibsoni</i>	<i>Crotalus horridus</i> 200CH (10 ⁻⁴⁰⁰)	canine (age not mentioned)	4 pills/ 4x days/ 14 days/ V.O.	↓number of parasites Clinical improvement Improvement of the haematological parameters	Chaudhuri and Varshney, 2007
<i>Trypanosoma cruzi</i>	Complex: Canova*	murine (28 days)	0.2mL/ day/ 20 days/ gavage	Change in the genetic profile (RAPD) when used in association with Benznidazol	Aleixo <i>et al.</i> ,2008
<i>Trypanosoma cruzi</i>	Phosphorus 12DH (10 ⁻¹²)	murine (adult)	Administered 3 drops (0,6mL)/ day/ V.O. with a dropper. Treated for 20 days after the infection.	↑PP ↑maximum peak of parasites ↑survival rate	Almeida <i>et al.</i> ,2008
	Biotherapic 12DH (10 ⁻¹²)		Administered 3 drops (0,6mL)/ day/ V.O. with a dropper. Treated before the infection for 20 days, with an interval of 10 days. Treated after the infection for 20 days.	↓PP ↓ maximum peak of parasites ↓mortality rate.	
<i>Trypanoso evansi</i>	Complex: CH Coxvit*	murine (60 days)	100drops/ L diluted in water, 30 days before inoculation.	↑survival rate	Silva <i>et al.</i> ,2009
			100drops/ L diluted in water from the inoculation onwards.	↑ survival rate	
			100 crops/ L diluted in water 20 days after the inoculation.	There wasn't ↑ survival rate nor a difference in the PP	
<i>Trypanosoma cruzi</i>		murine (28 days)		parasitaemia and the peak of parasites similar among the treated and control groups	Sandri <i>et al.</i> ,2009
	Biotherapic 17DH (10 ⁻¹⁷)	murine (56 days)	0,2mL/ for 20 days through gavage .	↑parasitaemia ↑peak of parasites	
<i>Trypanosoma cruzi</i>	Biotherapic 7DH(10 ⁻⁷)	murine (28 days)	0,2mL/ for 20 days after infection/ gavage	Similar parasitaemia among the treated and control groups ↑peak of parasites	Ferraz <i>et al.</i> ,2009
	Biotherapic 17DH (10 ⁻¹⁷)			↑parasitaemia	
	Biotherapic 12CH (10 ⁻²⁴)				
<i>Trypanosoma cruzi</i>	Biotherapic 7DH (10 ⁻⁷)	murine (28 days)	0,2mL/30 days pré infection/ V.O.	↑PPP ↑peak of parasites ↑ survival rates ↓red blood cell	Billoti <i>et al.</i> ,2009
<i>Trypanosoma cruzi</i>	Biotherapic 17DH (10 ⁻¹⁷)	murine (28 days)	0.2mL/animal/gava-ge from the 4th day of infection onwards.	↑tissue parasitism and areas of inflammation in the liver similar to the control group.	Sandri <i>et al.</i> ,2010

		murine (56 days)		↓ tissue parasitism and areas of inflammation in the liver.	
<i>Trypanosoma cruzi</i>	Biotherapic 7DH (10^{-7})	murine (28 days)	Treatment 3 days before and 3 days after the infection: 10µL/mL administered in water <i>ad libitum</i> . Treatment 3 days before the infection: 10µL/mL administered in water <i>ad libitum</i> . Treatment 3 days before and after the infection for a long period: 10µL/mL administered in water <i>ad libitum</i>	Better performance of the treatment administered before and after infection with: ↓ parasitaemia ↓ PP ↑ survival rate	Ferraz <i>et al.</i> , 2010
<i>Trypanosoma cruzi</i>	Complex: Canova*	murine (28 days)	0.2mL/ animal/ day/ gavage/ 20 days.	Early mortality ↑ peak of parasites Change in the tissue tropism.	Pupulim <i>et al.</i> , 2010
<i>Toxoplasma gondii</i>	Biotherapic 7DH (10^{-7})	murine (57-59 days)	Treatment pré infection: 0,1mL/4x day, after 2x/day/ 3 days.	↑ number of brain cysts ↑ ocular alterations ↓ ocular pressure	Braga <i>et al.</i> , 2011b
<i>Trypanosoma cruzi</i>	Biotherapic 7DH (10^{-7})	murine (28 days)	10µL/mL administered in water <i>ad libitum</i> for 20 days after infection. 10µL/mL administered in water <i>ad libitum</i> for 7 days before the infection. 10µL/mL administered in water <i>ad libitum</i> for 30 days before the infection.	↓ the area under the parasitemia curve, ↓ parasitemia peak and ↓ total parasitaemia of the infected mice without ↓ mortality rate or ↑ survival period. Only for the group treated 7 days before the infection.	Ferraz <i>et al.</i> , 2011a
<i>Trypanosoma cruzi</i>	Biotherapic 15DH (10^{-15}) Biotherapic 16DH (10^{-32}) Biotherapic 17DH (10^{-34}) Biotherapic Chord: 15DH (10^{-15}), 16DH (10^{-16}) e 17DH (10^{-17})	murine (28 days)	Treatment 3 days before and 3 days after the infection: 10µL/mL administered in water <i>ad libitum</i> . For all groups.	↓ parasitaemia ↓ PP ↓ mortality rate ↓ parasitaemia ↓ PP ↓ mortality rate ↓ parasitaemia ↓ PP ↓ mortality rate ↑ parasitaemia ↓ PP ↓ mortality rate	Ferraz <i>et al.</i> , 2011b
<i>Trypanosoma cruzi</i>	Biotherapic 17DH (10^{-17})	murine (28 days)	0.2mL/animal/gava-ge D.U. for 3 days. 10µL/ mL administered in water <i>ad libitum</i> for 20 days	↓ mortality rate Clinical improvement in the animals treated for longer periods.	Aleixo <i>et al.</i> , 2011a
<i>Trypanosoma cruzi</i>	Biotherapic 200DH (10^{-200})	murine (28 days) murine (38 days) murine (56 days)	For all groups: 10µL/ mL administered in water <i>ad libitum</i> for 24 hours 1µL/ mL administered in water <i>ad libitum</i> for long periods	↓ age ↑ parasitaemia (the older has the higher parasitaemia level) ↑ period of treatment ↓ parasitaemia. (the longer the period of treatment, the lower the parasitaemia level)	Aleixo <i>et al.</i> , 2011c
<i>Trypanosoma cruzi</i>	Biotherapic 17DH (10^{-17})	murine (28 days)	0.2mL/animal/gava-ge/ 3 days from the 4th day of infection onwards.	↑ apoptosis liver cells.	Sandri <i>et al.</i> , 2011a

<i>Trypanosoma cruzi</i>	Biotherapic 17DH (10^{-17})	murine (28 days)	0.2mL/animal/gava-ge D.U. 10µL/ mL administered in water <i>ad libitum</i>	↓ parasitaemia ↓ mortality rate	Sandri <i>et al.</i> , 2011b
<i>Toxoplasma gondii</i>	Biotherapic 200DH (10^{-200})	murine (56 days)	0.1mL/animal/ D.U day/gavage for 3 days after the infection.	↓ tissue parasitism.	Braga <i>et al.</i> , 2011a
<i>Toxoplasma gondii</i>	Biotherapic 200DH (10^{-200})	murine (56 days)	0.1mL/animal/ D.U day/gavage for 3 days after the infection	↓ brain parasitism	Ferreira <i>et al.</i> , 2011

Canova®: *Thuya occidentalis* 19DH *Bryonia alba* 18DH, *Aconitum napellus* 11DH, *Arsenicum album* 19DH, *Lachesis muta* 18DH.

CH Coxvit®: *Allium sativum*, *Carduus marianus*, *Arsenicum album*. (dynamizations not presented)

Table 4: Summary of characteristics of articles reviewed.

COMMENTS	ARTICLES		
There is no information about experiment repetitions.	Almeida & Pinto, 2002; Arenales & Coelho, 2002; Sukul <i>et al.</i> , 2005; Rocha <i>et al.</i> , 2005; Pereira <i>et al.</i> , 2005; Lira-Salazar 2006; Fonseca & Goloubeff, 2006; Queiroz <i>et al.</i> , 2006; Cavalcanti <i>et al.</i> , 2007; Silva <i>et al.</i> , 2007a	Silva <i>et al.</i> , 2008; Zacharias <i>et al.</i> , 2008; Aleixo <i>et al.</i> , 2008; Almeida <i>et al.</i> , 2008; Billotti <i>et al.</i> , 2009; Ferraz <i>et al.</i> , 2009; Silva <i>et al.</i> , 2009; Sandri <i>et al.</i> , 2009; Signoretti <i>et al.</i> , 2010; Pupulin <i>et al.</i> , 2010; Gazim <i>et al.</i> , 2010; Ferraz <i>et al.</i> , 2010; Sandri <i>et al.</i> , 2010; Aleixo <i>et al.</i> , 2011a;	Aleixo <i>et al.</i> , 2011c; Braga <i>et al.</i> , 2011a; Braga <i>et al.</i> , 2011b; Andrade <i>et al.</i> , 2011; Ferraz <i>et al.</i> , 2011a; Ferraz <i>et al.</i> , 2011b; Sandri <i>et al.</i> , 2011a; Sandri <i>et al.</i> , 2011b; Ferreira <i>et al.</i> , 2011; Costa-Júnior & Furlong, 2011; Deffune & Oliveira, 2011.
No replication	Fonseca & Goloubeff, 2006; Queiroz <i>et al.</i> , 2006; Cavalcanti <i>et al.</i> , 2007; Silva <i>et al.</i> , 2007a; Chaudhuri & Varshney, 2007; Chagas <i>et al.</i> , 2008;	Signoretti <i>et al.</i> , 2010; Pupulin <i>et al.</i> , 2010; Costa-Júnior & Furlong, 2011; Deffune & Oliveira, 2011.	
The articles do not accurately inform the type of tests (blinding, randomisation, blocking, stratification)	Almeida & Pinto, 2002; Arenales & Coelho, 2002; Sukul <i>et al.</i> , 2005; Rocha <i>et al.</i> , 2005; Pereira <i>et al.</i> , 2005; Lira-Salazar 2006; Fonseca & Goloubeff, 2006; Queiroz <i>et al.</i> , 2006;	Chaudhuri & Varshney, 2007; Chagas <i>et al.</i> , 2008; Zacharias <i>et al.</i> , 2008; Aleixo <i>et al.</i> , 2008; Almeida <i>et al.</i> , 2008; Silva <i>et al.</i> , 2008; Ferraz <i>et al.</i> , 2009; Silva <i>et al.</i> , 2009;	Signoretti <i>et al.</i> , 2010; Pupulin <i>et al.</i> , 2010; Gazim <i>et al.</i> , 2010; Andrade <i>et al.</i> , 2011; Costa-Júnior & Furlong, 2011; Deffune & Oliveira, 2011.
There is no explanation about the treatment, nor the medication components, or the potencies used, including commercial formulae.	Almeida & Pinto, 2002; Arenales & Coelho, 2002; Sukul <i>et al.</i> , 2005; Rocha <i>et al.</i> , 2005; Chaudhuri & Varshney, 2007;	Chagas <i>et al.</i> , 2008; Silva <i>et al.</i> , 2009; Signoretti <i>et al.</i> , 2010; Andrade <i>et al.</i> , 2011; Costa-Júnior & Furlong, 2011; Deffune & Oliveira, 2011.	
No information about statistical analysis.	Almeida & Pinto, 2002; Deffune & Oliveira, 2011.		
Unclear methodology	Almeida & Pinto, 2002; Deffune & Oliveira, 2011.		

REHBaR Reporting experiments in homeopathic basic research (Stock-Schroer *et al.*, 2009).

Publications and experimental design

Accurate description of the methods applied in studies that involve the use of highly diluted medications is relevant for the credibility of homeopathy, reproducibility of results and understanding of the mechanism of action of such agents. Factors such as lack of a blind design and appropriate statistical analysis may compromise the credibility of these studies. Also the use of inappropriate control groups may put results into

question [42]. Several authors [12,42,43] reported problems in published studies using highly diluted medications. While the reproducibility of experiments is an essential criterion in modern research,, it poses a major challenge to fundamental research using highly diluted medications [43]. Authors are required to describe techniques, methods and evaluation of data as completely and with as much detail as possible for readers to be able to understand and reproduce the experiments [12].

A number of criteria were formulated for reporting fundamental research on homeopathy [12] to help in the planning of experiments and presentation of results, particularly emphasizing the need for methodological rigor in the analysis of data using statistical methods.

Table 4 presents the characteristics of the articles [12,27,29,38-41,45-57] reviewed here. As it might be seen, their methods did not meet the requirements listed in REHBaR[13]. Several authors conducted clinical trials using commercial formulas, which do not always describe their composition and/or dynamization, making it difficult for other researchers to reproduce the experiment. The use of commercial formulas in clinical research is extremely valuable provided that the authors meet a minimum of the criteria required for the description of methods. In the sample analyzed here, personal communications indicated that the experiments had been repeated at least twice, whereas this information had not been mentioned in the methods section. This is an example of the features that should be improved[40].

The effect of homeopathic medications is still controversial, and thus the experimental parameters selected for evaluation must be carefully chosen to avoid the analyses of results, considering the animal as a whole.

Precise and thorough descriptions of methods allow different investigators to reproduce experiments, thus contributing to the debate on the effects of highly diluted medications.

Advances in methods and their description are natural occurrences and demand researchers to adapt to them. A clear example of this trend is provided by the papers published in a special issue of the journal *Homeopathic Research*, published by François Lamasson Institute of Homeopathy (IHFL)[58], which was devoted to studies on infection by *Trypanosoma cruzi* (1994). Although the content of the papers includes interesting data, they cannot be accepted as sound based on the current scientific standards as a function of the methods used and how they were described.

Although in recent years research on homeopathy has clearly advanced, both in the implementation of more consistent methods and in the description of data and methods, further improvement is still required. The acknowledgment of homeopathy depends on the credibility of investigators, which is achieved when standard methods are used, and their description, as well as of the results is performed with a minimum standard of accuracy and clarity, which were illustrated by the references mentioned[TT1] in this study [43].

Conclusion

Many benefits of the use of highly diluted medicines in the treatment of infectious diseases were found in the 39 papers published since 2000 that were located in databases PubMed and SciELO or specialized journals,. In experimental models or in actual treatment of animals, the homeopathic medications exhibited promising clinical outcomes. In both cases, the treated animals consistently showed better results when the medication was administered over a long period of time compared to shorter regimens. Several clinical studies used commercial formulas, which make the reproduction of the experiments difficult. The vast majority of the analyzed articles did not apply the criteria for reporting fundamental research in homeopathy. In parasitic infections, the effect of homeopathic medicines is still controversial, and experimental evaluation parameters should be carefully selected to avoid isolated analysis results[TT2]. Researchers should consider the results in relation to the health of the animals as a whole.

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Homeopatia em doenças parasitárias

RESUMO

Introdução: O uso de homeopáticos tem crescido devido o fato de que medicamentos convencionais algumas vezes não produzem o efeito esperado e também devido os seus efeitos indesejados que comprometem a adesão ao tratamento. Alguns trabalhos mostram os benefícios da utilização de medicamentos ultradiluídos no tratamento de doenças infecciosas. **Objetivo:** Esta revisão é uma discussão crítica sobre os aspectos da homeopatia, o estado atual da experimentação veterinária e o uso de medicamentos ultradiluídos nas infecções e doenças parasitárias. Os principais aspectos dos efeitos, esquemas de tratamento e/ou dinamizações utilizadas nos diferentes modelos são discutidos. **Metodologia:** Uma revisão de artigos publicados desde 2000 em revistas indexadas nos bancos de dados PubMed e Scielo e revistas especializadas foi utilizada para pesquisa das palavras-chave: parasitoses/ homeopatia e parasitoses/ ultradiluídos. **Resultados:** Experimentos recentes demonstraram o efeito biológico dos medicamentos ultradiluídos nas infecções parasitárias, com redução no número de parasitos e melhora da condição clínica nos animais tratados. Alguns artigos apresentaram problemas na descrição da metodologia o que pode comprometer a reprodutibilidade dos experimentos. **Conclusão:** O conhecimento da homeopatia depende da credibilidade dos grupos de pesquisa. Embora nos últimos anos a pesquisa em homeopatia tenha apresentado um claro desenvolvimento, tanto na implantação de metodologias mais consistentes quanto na descrição dos dados e métodos publicados, muito ainda deve ser melhorado neste campo. Descrições precisas e detalhadas poderiam contribuir para o avanço do uso da homeopatia, o que poderia beneficiar a comunidade em geral, na prática, a partir destes resultados.

Palavras-Chave: homeopatia, infecções parasitárias, Medicina Complementar e Alternativa

Homeopatía en parasitosis

RESUMEN

Introducción: El uso de medicamentos homeopáticos viene aumentado, en parte porque los convencionales a veces no producen los efectos deseados y en parte porque los efectos colaterales de estos comprometen la adhesión del paciente al tratamiento. Varios estudios demostraron beneficio con el uso de medicamentos homeopáticos en el tratamiento de enfermedades infecciosas. **Objetivos:** El objetivo de esta revisión fue someter a análisis crítico varios aspectos

de la homeopatía, el estado presente de la experimentación veterinaria y el uso de altas diluciones de medicamentos en enfermedades infecciosas y parasitarias. Son discutidos aspectos principales de los efectos, regímenes terapéuticos y/o dinamizaciones utilizadas en varios modelos. **Métodos:** Se realizó una revisión de artículos publicados a partir del 2000 en periódicos indexados en las bases de datos SciELO y PubMed usando los descriptores “parasitosis/homeopatía” y “parasitosis/altas diluciones”. Resultados: Varios estudios experimentales recientes demostraron efectos biológicos de medicamentos altamente diluidos en parasitosis, resultando en disminución del número de parásitos y mejoría del estado clínico de los animales afectados. En varios artículos, sin embargo, la descripción de la metodología es problemática, lo que compromete la reproducibilidad de los experimentos. **Conclusión:** El reconocimiento de la homeopatía depende de la credibilidad de los investigadores. Aunque la investigación en homeopatía se ha desarrollado notablemente en los últimos años, tanto en la implementación de metodologías más consistentes, como en la descripción de datos y métodos, mejorías son aun necesarias. Descripciones precisas y detalladas contribuirán al progreso del uso de la homeopatía de modo que resulte en beneficio práctico para la sociedad en general.

Palabras-clave: homeopatía, parasitosis, MAC (medicina alternativa y complementaria).

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