The effect of Artemisia species raw plants in treating domestic pigeons infected with *Ascaridia columbae* and *Escherichia coli* bacteria

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Abstract:

The objective of this study was to assess the impact of raw wormwood on the mortality rate of *Ascaridia columbae* and *Escherichia coli* in domestic pigeons. Bird sellers in Najaf, Iraq, gave us birds that were sick and birds that were healthy. Some physiological parameters were measured for all the birds before and after they were treated with the plant. The research clearly showed that raw wormwood had an effect on the death rate of worms and *Escherichia coli* bacteria during the treatment period. The plant did not harm the pigeons in any way. The infected birds' health improved after the harmful organisms were removed, as shown by their weight gain and the return of their blood parameters to normal.

Keywords:

Artemisia , domestic pigeons, *Ascaridia columbae* and *Escherichia coli*

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1.Introduction

Medicinal herbs are a natural gift to human beings for healthy life without disease. They are also essential to health promotion and are commonly believed to be safer and more effective in the treatment of a number of diseases. Plants have long been employed for the treatment of a wide variety of diseases in humans and animals. The miraculous medicinal properties of these plants have been used from the beginning of human life in one or another way as a traditional cure to allopathic medicine and are universally popular for all strata of human society (1).The Asteraceae (Compositae) family has a lot of plants in it, and *Artemisia spp*. (wormwood) is one of the biggest and most common groups. This genus is found all over the world and has more than 500 species. It is common in temperate areas of Europe, Asia, and North America. Essential oils, alkaloids, flavonoids, glycosides, saponins, tannins, and coumarins are just some of the bioactive compounds that *Artemisia* has (2).

A lot of Artemisia species have a lot of artemisinin, which is a phytochemical. But the amount of it in a plant depends on the kind of plant, where it is grown, and when it is harvested (3). Some *Artemisia* species lack artemisinin; however, they are utilized for the extraction of commercially valuable wormwood oil (4). Sesquiterpene lactones are also found in artemisia, which is what makes these plants good for making drugs and medicines. Researchers have identified various types of sesquiterpene lactones in the aerial components of *Artemisia*. The most common ones are eudesmanolides, and the second most common are germacranolides (5,6).

Nematodes are one of the most common internal parasites that hurt pigeons. Numerous studies from various global regions have consistently detected *Ascaridia columbae, Capillaria spp., Dispharynx spp., and Tetrameres spp*. in pigeons (7). This study sought to evaluate the effects of crude wormwood (*Artemisia spp*.) on *Ascaridia columbae* and *Escherichia coli* in fecal samples collected from domestic pigeons.

Domestic pigeons can harbor various bacterial species, including *Escherichia coli*. This bacterium is regarded as a significant pathogen in poultry; moreover, it poses a public health threat, as pathogenic strains identified in wild pigeons have been linked to human diseases. The virulence factors of E. coli play a big role in how infections happen, as they help the bacteria spread and cause disease. Moreover, pigeons may carry antibiotic-resistant *E. coli*, and these resistance characteristics can be transmitted to other strains, representing an additional risk to public health (8).

2. Methodology

2.1 Samples collection

Bird sellers in local markets sold us 30 domestic pigeons. Weighing the body and taking blood samples from the wing vein were done to check for inflammation by looking at certain hematological parameters. We also looked for helminths in fecal samples by using a direct wet fecal smear under a light microscope. We also weighed the birds. Also, 10 pigeons that looked healthy were collected after confirming that their fecal tests were negative. These pigeons were used as the control group.

2.2 Preparation of the crude aqueous wormwood extract

The herbal shop sold the wormwood powder, which was then classified. Then, 40 grams of wormwood powder were weighed out and mixed with 150 ml of hot water. To get the active ingredients out, the mixture was stirred and covered for 24 hours. After that, it was filtered and kept for the experiment. After that,

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5 ml of the filtered wormwood water was taken and added to 100 ml of the pigeons' drinking water. Also, healthy pigeons were given water that didn't have wormwood in it as a control.

3. Results and discussion

The majority of the examined pigeons exhibited clinical signs indicative of compromised health, including emaciation, ruffled feathers, and varying degrees of diarrhea. Before treatment, all 30 samples from the treated group tested positive for *Ascaridia columbae* eggs and *Escherichia coli* [30 (100%) for each]. This suggests that the group had both nematode infection and colibacillosis at the same time. After giving the pigeons the crude wormwood preparation, a fecal analysis showed that all of the A. columbae eggs were gone and that *E. coli* was not found in the treated pigeons [0 (0%)]. This shows that the treatment had a strong effect in this study. Conversely, the control group (n = 10) consistently tested negative for both pathogens during the entire study duration. Table (1) shows a summary of all the results.

Table 1: Fecal examination results before and after treatment

Pathogens	**Before Treatment (n=30) n(%)**	**After treatment (n=30) n(%)**	**Control (n=10) n(%)**
Ascaridia columbae eggs	30(100%)	0(0%)	0(0%)
Escherichia coli	30(100%)	0(0%)	0(0%)

Before and after treatment with the filtered crude wormwood preparation, body weight was measured. After one month of giving the preparation through drinking water, the fecal samples from the treated pigeons were looked at again and found to be free of both parasites and *Escherichia coli.* Table (2) shows that treatment also led to a clear increase in body weight. This weight gain after treatment is normal for people who have recovered from intestinal parasitism, which can make it harder for the body to use nutrients and cause weight loss before treatment.

Table (2). Mean body weight of pigeons (kg) before and after treatment

Groups	**Before treatment (Kg)**	**After treatment (Kg)**
Control(n=10)	0.248	-
Treated(n=30)	0.210	0.317

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The study results showed that treating infected birds with plants had a big effect on their blood parameters. After treating the birds, their platelet count and red blood cells went up. The parameters returned to normal levels during the first three weeks following treatment, which we attribute to the bird's response to the extract after the parasite was eliminated, as shown in Table (3).

Table (3): Mean hematological parameters before and after treatment

Groups	Plt	RBC
Control	97	3.29 (2.5-3.5)
Before treatment	140	1.93
After treatment	85	3.14

The parasite's decline is due to the presence of toxic chemicals like phenolic compounds and essential oils that keep the parasite away. Wormwood is composed of various vital chemicals that include terpenoids, flavonoids, coumarins, caffeoylquinic acidetylenesac , and sterols. These oils are significant in nature because they influence the living beings in multiple ways such as killing of bacteria, viruses, and fungi (9). Wormwood, furthermore, yields valuable oils,including thuy alcohol, pinene, cadinene, ,phellandrene and ,thujone as well as others. It has been proven effective for various biological activitieslike analgesic, anticoccidial, antidiabetic, antifungal,antiviral , and anti-herpes virus (10).

Wormwood's potent anti-worm properties are mainly ascribed to its abundance of volatile essential oils like thujone and sesquiterpene lactones, especially artemisinin. By producing reactive oxygen species and free radicals, these bioactive metabolites cause severe oxidative stress in roundworms, which severely damages the parasite's exoskeleton. Additionally, these substances impair the worms' cellular metabolism and neuromuscular coordination, which eventually results in paralysis, death, and expulsion (11).

Wormwood is also used in the production of artemisinin, a sesquiterpene lactone that occurs naturally in some plants and can cause allergies and toxicity when consumed at high levels, especially by grazing animals. It has strong antimalarial properties against Plasmodium falciparum, mostly because it has a biogenic endoperoxide in it. People all over the world know that this compound is a good way to treat malaria because it stops the parasite's life cycle (12). The wormwood extract showed a lot of promise against coccidiosis in young rabbits. A dose of 1200 mg/kg led to a 96.36% drop in oocyst shedding and faster weight gain, which suggests that it could be a good alternative to traditional treatments for parasitic infections (13). It also contains phenolic compounds that work as antioxidants (14), raising the levels of glutathione (GSH), catalase (CAT), and superoxide dismutase (SOD) while lowering the levels of lipid peroxides, The research also showed that the ethanolic extract from the flower buds of A. nilagirica is effective against Trichinella spiralis, intestinal worms that cause trichinosis, a disease that affects people, pets, and wildlife all over the world.

(15). *Artemisia absinthium* has therapeutic benefits that go beyond just treating malaria; it can also be used to treat other parasitic diseases.

Natural coumarins are plant-based substances that can fight viruses, bacteria, and other living things, as well as help with health problems. These traits include the ability to lower blood pressure, kill parasites, protect

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against free radicals, stop reproduction, kill worms, and reduce inflammation. A variety of coumarin compounds, such as umbelliferon, scopoletin, visnadin, bergapten, fraxetin, and marmin, have exhibited anti-inflammatory effects (16).

The high effectiveness of crude wormwood extract found in this study adds significantly to the body of knowledge regarding the use of wormwood (*Artemisia absinthium*) in veterinary medicine worldwide. It's interesting to note that our findings, which show total (100%) eradication of *Ascaridia columbae*, run counter to some recent studies on poultry; for instance, feeding wormwood to laying hens demonstrated limited effectiveness against adult *Ascaridia galli* (17). The total elimination attained in the pigeon model might indicate a particular sensitivity to a specific strain of A. columbae bacteria, or it might show that the crude extract is better absorbed and bioavailable when given through drinking water than when added to solid feed. Furthermore, recent microbiological studies highlighting the powerful antibacterial activity of *Artemisia absinthium* extracts rich in phenolic compounds and essential oils against Gram-negative pathogens in poultry are strongly supported by the total eradication of Escherichia coli in the treated group(18). Lastly, wormwood extracts have been demonstrated to repair intestinal mucosal damage caused by parasites, positively alter intestinal microbiota, and thus enhance nutrient absorption and overall growth performance in broiler chickens (19). These findings are consistent with our study's significant increase in weight and hematologic recovery following treatment.

Conclusion

Crude wormwood was effective in reducing *Ascaridia columbae* worms and *E. coli* bacteria in infected pigeons during the treatment period. It was also safe and did not harm the pigeons; in fact, it was associated with improved health (weight gain and return of blood parameters to normal) after the pathogens were eliminated.

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Author's Contributions

The authors collaborated on the research (bird collection and clinical sampling), laboratory tests and analyses, and data collection. They also organized, prepared, wrote, reviewed, and edited the manuscript, in addition to securing funding. All authors read and approved the final manuscript.

Ethics

This study was conducted in accordance with applicable animal welfare guidelines. All pigeon-related procedures were followed to

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minimize stress and avoid any unnecessary harm.

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