

ETHNOVETERINARY PRACTICES IN THE TREATMENT OF PROTOZOAN DISEASES IN ANIMALS

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Abstract

The importance of ethnoveterinary medicine is particularly evident among small holder farmers who depend heavily on livestock for milk, meat, draught power and household income. This article summarizes uses of ethoveterinary medicine in treatment of trypanosomosis, babesiosis and coccidiosis

Keywords: ethoveterinary, trypanosomosis, babesiosis and coccidiosis

Introduction

Ethnoveterinary medicine represents the traditional knowledge, beliefs and practices used by livestock owners and traditional healers to prevent and treat diseases in animals. In many rural and resource-limited communities, medicinal plants remain an important source of animal health care because conventional veterinary medicines may be expensive or difficult to obtain. Traditional veterinary practices have therefore developed through generations of observations and experience, with plants frequently being used as locally available therapeutic resources (Rahmatullah et al., 2010).

The importance of ethnoveterinary medicine is particularly evident among small holder farmers who depend heavily on livestock for milk, meat, draught power and household income.

Among the diseases of livestock, protozoan infections are particularly important because they can cause poor growth, reduced productivity, anaemia, diarrhoea, weakness and in severe cases, death. Important protozoan diseases are trypanosomiasis, babesiosis, theileriosis, coccidiosis, etc. Research into traditional plant remedies for these diseases provides an interesting link between indigenous knowledge and modern pharmacological investigation (Shilema et al., 2013; McGraw and Eloff).

Traditional Knowledge as a Veterinary Resource

Traditional veterinary knowledge is usually closely associated with the local environment. Livestock owners and traditional practitioners identify useful plants from their surroundings and develop methods of preparing and administering

them based on accumulated experience. The Bangladesh ethnoveterinary survey showed that traditional practitioners used different plant parts, including whole plants, leaves, seeds and roots, depending on the condition being treated (Rahmatullah et al., 2010).

The documentation of this knowledge is important because ethnoveterinary practices may provide starting points for identifying plants with biologically active compound. However, traditional use alone does not establish therapeutic efficacy. Proper botanical identification, laboratory testing, toxicity evaluation and controlled animal studies are necessary before a traditional remedy can be considered a scientifically validated veterinary treatment (McGraw and Eloff; Rahmatullah et al., 2010).

Trypanosomiasis: A Major Protozoan Disease

Animal trypanosomiasis, commonly known as Nagana, is an important protozoan disease of livestock. It is caused by flagellate protozoa of the genus *Trypanosoma* and is transmitted principally by blood feeding vectors, particularly tsetse flies in affected regions. The disease can adversely affect livestock production and represents a major constraint to animal agriculture in areas where transmission occurs (Shilema et al., 2013).

The importance of trypanosomiasis has encouraged livestock keepers to develop traditional approaches for both treatment of infected animals and control of the vectors. In Amaro district of Southern Ethiopia, Shilema et al. documented ethnoveterinary practices used by traditional medicine practitioners against animal

trypanosomiasis and tsetse flies. Their study recorded 18 medicinal plant species, of which seven were indicated for treatment of trypanosomiasis, four for tsetse-fly repellency and seven for both purposes (Shilema et al., 2013).

Plants Traditionally used against Trypanosomiasis

Several Plants, particularly *Lepidium sativum*, *Allium sativum*, *Echinops kebericho*, *Withania somnifera* and *Myrica salicifolia* are used in treatment of trypanosomiasis. *Allium sativum*, *Aloe vera*, *Lepidium sativum*, *Nicotiana tabacum*, *Teradenia riparia*, *Lobelia giberroa* and *Trifolium burchellianum* were also reported in relation to tsetse-fly repellency (Shilema et al., 2013)

The methods of preparation varied according to the plant and its intended use. For example, plant materials were chopped or ground and mixed with water, while some preparations involved the use of plant gel. Administration could be oral, topical or both. Such practices demonstrate that ethnoveterinary treatment is not simply a matter of selecting a plant; preparation method, plant part and route of administration are also important components of traditional knowledge (Shilema et al., 2013).

The Ethiopian study also highlights an interesting feature of traditional disease management: some plants were used both against the protozoan disease and against its vector. This approach reflects an understanding, developed through local experience, that controlling disease transmission may require attention to both the infected animal and the vector. Nevertheless, the reported traditional uses should be regarded as ethnobotanical evidence rather than proof of clinical efficacy (Shilema et al., 2013).

Babesiosis and traditional remedies

Babesiosis is another important protozoan disease affecting animals. It is caused by *Babesia* species and is generally associated with tick transmission. Because of its importance in veterinary medicine, several plants used traditionally in ethnoveterinary practices have been examined experimentally for antibabesial activity (Naidoo et al., 2005)

One important investigation examined four ethnoveterinary plants- *Rhoicissus tridentata*, *Elephantorrhiza elephantina*, *Aloe marlothii* and *Urginea sanguinea*- against *Babesia caballi* in vitro (Naidoo et al., 2005). The researchers used established cultures and compared the effects of plant extracts with conventional antibabesial drugs,

including imidocarb dipropionate and diminazine aceturate (Naidoo et al., 2005).

Among the four plants examined, the acetone extract of the rhizomes of *Elephantorrhiza elephantina* demonstrated antibabesial activity at the concentration tested, whereas the extracts of *Urginea sanguinea*, *Rhoicissus tridentata* and *Aloe marlothii* did not show activity in the particular assay. The study therefore provides an important example of how plants selected on the basis of ethnoveterinary use can be subjected to laboratory screening to identify potentially active candidates (Naidoo et al., 2005).

The study also illustrates why scientific evaluation is essential. The activity of a crude plant extract can depend on the plant part used, solvent of extraction, concentration and experimental method. Consequently, the traditional use of a plant should not automatically be interpreted as evidence that every preparation of that plant will be effective against a protozoan infection (Naidoo et al., 2005)

Coccidiosis and Herbal Approaches

Coccidiosis is a protozoan disease caused by organisms such as *Eimeria* and *Isospora* species and is particularly important in poultry production. The disease can reduce productivity and cause considerable economic losses, creating interest in alternative approaches for its prevention and management (Naidoo et al., 2008).

An experimental study investigated four plants extracts with antioxidant properties: *Combretum woodii*, *Tulbaghia violacea*, *Vitis vinifera* and *Artemisia afra* against artificially induced mixed *Eimeria* infection in broiler chickens. Toltrazuril was used as a positive control. The study was designed to determine whether antioxidant rich plant extracts could reduce the effects associated with coccidial infection (Naidoo et al., 2008).

The findings showed considerable differences among the plants. *Combretum woodii* was toxic at the tested dose, whereas *Tulbaghia violacea*, *Vitis vinifera* and *Artemisia afra* produced feed-conversion results comparable to those observed with toltrazuril at the respective experimental doses. In addition, *T. violacea* significantly reduced oocyst production. These findings demonstrate both the potential and the limitations of plant based approaches to coccidiosis control (Naidoo et al., 2008).

The coccidiosis study is particularly valuable because it demonstrated that a plant extract can show promising biological activity while another plant extract may produce toxicity. Therefore, the concept that a remedy is "natural" should never be

interpreted as meaning that it is automatically safe. Dose determination and toxicity assessment are essential components of developing plant-derived veterinary medicines (Naidoo et al., 2008).

From Traditional Practice to Scientific Validation

The shift from folklores to scientific research based treatment has several stages under its ambit. Firstly, acknowledgment helps in identification of plants with medicinal properties. Then a series of laboratory assays facilitates botanical authentication and evaluation. Evaluation of a plant for its anti-prototozoal activity is undertaken through culturing parasites, microscopic assessment, assessment of growth and through animal-infection model (Naidoo et al., 2005).

Investigation of *E. elephantine*, a ethnoveterinary plant for its antibabesial activity explains this process lucidly (Naidoo et al., 2005). Likewise, investigation of anti-coccidial activity of many plant extracts underscores the importance of moving beyond laboratory testing. Testing in clinical cases as laboratory data are not necessarily translated into therapeutic efficacy in live animals (Naidoo et al., 2008).

Importance of Preserving Indigenous Knowledge

Ethnoveterinary knowledge has emerged as scientific and cultural resource. The Bangladeshi surveys illustrated above report many information like medicinal plants method of formulations and routes of administration etc. Such knowledge might not pass on to future and get lost if not documented properly (Rahmatullah et al., 2008).

Also, the documentation should be followed by scientific validation. The Ethiopian study is suggestive of the idea that these indigenous plants facilitate future phytochemical as well as pharmacological investigations. It highlights the complementary relationship observed between folklores and modern science which can suggest promising candidates, while experimental research can provide efficacy and Safety data (Shilema et al., 2013).

Safety concerns and challenges

In spite of these promises, herbal medicines should not be perceived as whole replacement of veterinary treatment without evidence and scientific research. Species, geography, part of the plant, harvesting season, extraction process and dose can influence phytochemistry and efficacy. From the antibabesial study it is evident that standardization is important since different plant extracts demonstrated different level of efficacy (Naidoo et al., 2005).

Toxicity is another important consideration. The experimental coccidiosis study showed that *Combretum woodii* was extremely toxic to birds at the tested dose, even though other plant extracts showed more favourable responses. Therefore, future development of ethnoveterinary remedies must include toxicity studies, dose optimization and appropriate evaluation of possible adverse effects before recommendations are made for routine animal use (Naidoo et al., 2008).

The Way Forward

The future of ethnoveterinary medicine lies not in replacing traditional knowledge with modern science, but in bringing the two together. Traditional practitioners can provide valuable leads about plants that have been used repeatedly for particular animal diseases, while modern science, but in bringing the two together. Traditional practitioners can provide valuable leads about plants that have been used repeatedly for particular animal diseases, while modern parasitology, phytochemistry, pharmacology and veterinary medicine can determine the active constituents, mechanisms of action, effective doses and safety profiles of those plants (Rahmatullah et al., 2020; Shilema et al., 2013).

Protozoan diseases such as trypanosomosis, babesiosis and coccidiosis provide good examples of this approach. Traditional plant use against trypanosomosis has been documented in Ethiopia, antibabesial activity has been demonstrated for selected ethnoveterinary plants in laboratory studies, and anticoccidial effects have been observed for selected plant extracts in experimentally infected poultry (Shilema et al., 2013; Naidoo et al., 2005; Naidoo et al., 2008).

Conclusion

Ethnoveterinary practices constitute an important reservoir of traditional knowledge for managing animal diseases. In the field of protozoan diseases, evidence from the available studies demonstrates that traditional knowledge has identified plants that merit scientific investigation against trypanosomosis, babesiosis and coccidiosis. However, traditional use and scientific efficacy should not be treated as equivalent. The most promising approach is systematic documentation followed by botanical authentication, phytochemical investigation, laboratory screening, animal studies and rigorous safety evaluation (Naidoo et al., 2005; Naidoo et al., 2008).

The integration of indigenous knowledge with modern veterinary science may ultimately contribute to the discovery of affordable and locally

accessible approaches for animal health. However, it requires scientific validation and research. It can provide potential leads for veterinary drug discovery (Rahmatullah et al., 2010; Shilem aet al., 2013).

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