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Ajabe JS

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Borikar ST

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Digraskar SU

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Siddiqui MFMF

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Narladkar BW

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

NS Kumbhar

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Correspondence

Ajabe JS

Department of Veterinary
Clinical Medicine, Ethics &
Jurisprudence College of
Veterinary and Animal Sciences,
Parbhani, MAFSU Maharashtra,
India

Therapeutic efficacy of *Azadirachta indica* (Neem) leaves powder against helminthosis in donkeys

Ajabe JS, Borikar ST, Digraskar SU, Siddiqui MFMF, Narladkar BW and NS Kumbhar

Abstract

Present study was carried out to evaluate the efficacy of *Azadirachta indica* (Neem) leaves powder against helminthosis in donkeys. Fecal samples were examined for helminthosis and 30 positive (EPG > 400) donkeys were randomly divided into three groups consisting ten donkeys in each group. Affected donkeys were subjected to different dosage 375 mg/kg, 450 mg/kg and 525 mg/kg body weight of *Azadirachta indica* leaves powder orally as an anthelmintic daily for three days respectively in group I, group II and group III. The fecal samples from each donkeys were examined on day 3rd, 7th, 14th, 21st and 28th post treatment in all the groups. There was significant decrease in ($p < 0.05$) EPG count in all the groups up to 28th days. It is concluded that *Azadirachta indica* (Neem) leaves powder can be used as anthelmintic to control the gastro-intestinal parasites in donkeys.

Keywords: *Azadirachta indica*, EPG, helminthosis, powder, anthelmintic

1. Introduction

Parasitic helminths are one of the most common factors that constrain the health and working performance of working donkeys worldwide (Zerihun *et al.*, 2011) [9]. Donkeys are susceptible to various types of parasitic diseases like large and small *Strongyles*, *Ascarids*, *Pin worms*, *Gastrophilus*, *Lung worms*, *Flukes* and *Tape worms*. These endoparasites compete for essential nutrients which directly affect the growth of animals, reduce working efficacy of donkeys and sometimes may cause mortality in severely affected animals (Ibrahim *et al.*, 2011) [4].

Anthelmintic resistance is becoming a major worldwide constraint now a days in animals under field conditions. It depends upon various factors like use of same group of drug frequently, under dosing of drugs, use of single anthelmintic drug continuously and prophylactic mass treatment to the animals which leads to development of resistance in helminths (Hatem and Shalaby 2013) [3].

Medicinal plants can play an important role in reducing the drug resistance for treatment of helminthosis. *Azadirachta indica* (Neem) is most commonly used medicinal plant in India to combat various types of diseases in human as well as animals and it is having broad spectrum biological activity. In India this medicinal plant is popularly called as Indian neem. Special peculiarities of this plant are that it is always evergreen in nature and cultivated in various regions of India. (Biswas *et al.*, 2002) [2]. It contains several biological active principles like *Azadirachta*, meliantriol and salanin (Naganishi 1975 and Lavie *et al.*, 1967) [7, 5]. *Azadirachta indica* has various types of pharmacological actions like anti-inflammatory, antipyretic, analgesic, immunostimulant, hypoglycemic, antiulcer, anti-sterility, antimalarial, antifungal, antibacterial, antiviral, anticarcinogenic, hepatoprotective, antioxidant and anthelmintic. Each part of the plant is having specific medicinal role for curing disease condition e.g. leaves are used against leprosy, eye problem, intestinal worm, skin ulcers etc. Bark of plant is used as analgesic and curative for fever. Fruits are used to relieve piles, intestinal worm, urinary disorder, wounds and leprosy. Twigs are used for the treatment of cough, asthma, piles, tumours etc while gums are effective against skin diseases, ringworm etc. Neem oil is much helpful for the treatment of leprosy and removal of intestinal worms. Thus Neem plant (*Azadirachta indica*) is a medicinal plant having diversified and versatile role in the treatment of various disease conditions in human as well as in animals (Biswas *et al.*, 2002) [2]. Therefore, the present research work was undertaken to evaluate the *Azadirachta indica* leaves powder as an anthelmintic to treat helminthosis in donkeys.

Materials and Methods

Preparation of *Azadirachta indica* (NEEM) Leaves Powder

For preparation of *Azadirachta indica* leaves powder, fresh leaves from the neem plant were collected by hand plucking, washed using clean water and air dried under shed. Then they were cursed and grinded to prepare powder.

Selection and Treatment of Animals

Fecal sample from donkeys was collected directly from the rectum of animal irrespective of age and sex in and around Parbhani, Latur, Beed and Nanded districts of Maharashtra State for the screening of helminth infection in donkeys. The donkeys affected with endoparasitic infection (EPG>400) were divided into the three groups consisting of ten donkeys (n=10) in each group and one group of 10 healthy donkeys was kept as healthy control. *Azadirachta indica* leaves powder was used as anthelmintic with three different doses in three groups viz; 375 mg/kg, 450 mg/kg and 525 mg/kg body weight respectively orally for three days and the fecal samples were examined on day 0 (before treatment) 3rd, 7th, 14th, 21st and 28th days (post treatment) for presence of eggs of parasites.

Calculation of Anthelmintic Efficacy of Drug

The percentage of fecal egg count rate (FECR%) was calculated by using following formula.

$$\text{FECR (\%)} = \frac{(\text{Pre-treatment EPG} - \text{post treatment EPG})}{(\text{Pre-treatment EPG})} \times 100$$

Data Analysis

The statistical analysis of the data was analyzed by employing CRD using WASP (Web Agri Stats Package) version 2.0.

Result and Discussions

The group I was treated with 375 mg/kg body weight of *Azadirachta indica* leaves powder for three days. The mean EPG in this group was 830 ± 70.71 on day zero (before therapy) which reduced to 800 ± 59.16, 760 ± 35.74, 740 ± 59.39, 690 ± 38.72 and 640 ± 27.38 on day 3rd, 7th, 14th, 21st and 28th day respectively. The Fecal egg count reduction (FECR) was 3.61%, 8.43%, 10.84%, 16.86% and 22.89% on 3rd, 7th, 14th, 21st and 28th day respectively. The findings of Mahboob *et al.* (2008) [6] who used the same dose rate of *Azadirachta indica* dried leaves in horses infected with strongylosis are in agreement with the present findings. The dose was given single time and reduction in ova was 6.89%, and 8.62% on day 7th and 14th respectively.

The mean values of EPG in group II were 900 ± 59.62, 860 ± 45.21, 800 ± 29.81, 770 ± 33.49 and 680 ± 29.05 while the fecal egg count reduction was 5.26%, 9.4%, 15.78%, 18.94% and 28.42% respectively on day 3rd, 7th, 14th, 21st and 28th day after the therapy. Decrease in EPG count was highly significant ($p < 0.1$) when compared to pre-treatment mean value of EPG and it was found that there was increasing trend of FECR from day zero to 28th day. The highest FECR was observed on 28th day and it was 28.42 per cent. Amin *et al* (2011) [11] studied the efficacy of 10% neem water extract against nematodes in sheep and observed significant decrease in EPG count on day 7th, 14th, 21st and 28th respectively anthelmintic efficacy of *Azadirachta indica* leaves powder shown in Table No 1.

Table 1: Anthelmintic efficacy of different doses of *Azadirachta indica* against helminths affected donkeys (Values are Mean ± SE of 10 individual observations in each group)

Sr. No	Groups	Pre-treatment (EPG)	Post treatment (EPG)				
			0 Day	3 rd day	7 th day	14 th day	21 st
1	Group-I (375 mg/kg b.wt <i>Azadirachta indica</i> dry leaves powder)	830±70.71 ^{abc}	800±59.16 ^{bcd} (3.61%)	760±35.74 ^{cdef} (8.43%)	740±59.39 ^{cdef} (10.84%)	690±38.72 ^{defg} (16.86%)	640±27.38 ^{efg} (22.89%)
2	Group-II (450 mg/kg b.wt <i>Azadirachta indica</i> dry leaves powder)	950±59.62 ^a	900±59.62 ^{ab} (5.26%)	860±45.21 ^{abc} (9.4%)	800±29.81 ^{bcd} (15.78%)	770±33.49 ^{bcde} (18.94%)	680±29.05 ^{defg} (28.42%)
3	Group-III (525 mg/kg b.wt <i>Azadirachta indica</i> dry leaves powder)	860±80.55 ^{abc}	800±53.74 ^{bcd} (6.97%)	740±52.06 ^{cdef} (13.95%)	690±45.82 ^{defg} (19.76%)	630±47.25 ^{fg} (26.74%)	570±42.29 ^g (33.72%)

a, ab, abc, bcd, bcde, cdef, defg, efg, fg, g, superscripts indicate statistical significant difference at $P < 0.05\%$ and $P < 0.1\%$ within the columns

The group III was treated with the *Azadirachta indica* leaves powder at the dose rate of 525 mg/kg body weight orally for three days and the mean EPG values were 860 ± 80.55, 800 ± 53.74, 740 ± 52.06, 690 ± 45.82, 630 ± 47.25 and 570 ± 42.29 on 0, 3rd, 7th, 14th, 21st and 28th day respectively. It was found that there was significantly high ($p < 0.1$) decrease in EPG count when compared to the EPG before treatment. The FECR was 6.97%, 13.95%, 19.76%, 26.74% and 33.72% on day 3rd, 7th, 14th, 21st and 28th day post treatment. It was observed that there increasing trend of FECR from 3rd to 28th day of post treatment and the highest FECR (33.72%) was recorded on 28th day. The current finding coincides with Yadav (2014) who evaluated the efficacy of *Azadirachata indica* leaves powder at the dose rate of 525 mg/kg b.wt. In horse affected with nematodes infection and found efficacious 11.03%, 16.91% and 23.53% respectively on 7th, 14th and 21st day of post treatment.

Conclusion

In present study, it was observed that the efficacy of *Azadirachta indica* increases with increase in dose rate and

highest efficacy was observed at the dose rate of 525 mg/kg body weight. It was concluded that *Azadirachta indica* leaves powder is moderately efficacious as anthelmintic in donkeys and can be used in rural areas as cheapest herbal anthelmintic.

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