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Rupesh Kusumbhi

Department of Zoology,
Government Meera Girls College,
Mohan Lal Sukhadia University,
Udaipur, Rajasthan, India

Dr. Gayatri Swarnakar

Professor, Department of
Zoology, Government Meera
Girls College, Mohan Lal
Sukhadia University, Udaipur,
Rajasthan, India

***In vitro* acaricidal effect of the medicinal plant *Tinospora cordifolia* on pathogenic ticks of domestic cows in the Sikar district, Rajasthan, India**

Rupesh Kusumbhi and Gayatri Swarnakar

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Abstract

Ticks transfer many disease-causing germs and make milk dirty. When cows have infections of ticks, they lose blood, which can cause anemia, weight loss, frailty, less productivity, and less milk output. Because of this, the animal becomes weak, and productivity goes down a lot. Ticks are pathogenic ectoparasites that are often found on cows. Live ticks were collected from infected domestic cows from different tehsils in randomly selected villages in the Sikar district of Rajasthan. After removing the ticks carefully from the infected cows, they were again washed several times in physiological saline. These ticks were kept in 0.7% physiological saline for identification and investigations. Species of the ticks were identified with the help of a stereomicroscope. In the present study, the acaricidal effects of the cypermethrin-EC drug and alcoholic and aqueous extracts of *Tinospora cordifolia* stems were evaluated on the pathogenic ticks. *In vitro* studies to evaluate the acaricidal and healing effects of plant extracts exhibited dose-dependent mortality, paralyzing or causing death within the incubation period on ticks. Results were compared with those of the cypermethrin drug at different concentrations. Cypermethrin-EC drugs cause low motility, and the alcoholic extract from medicinal plants is stronger than the water extract. The current research work would be significant because the extracts of the *Tinospora cordifolia* medicinal plant will help prepare affordable, environment-friendly, acaricidal, and veterinary herbal drugs to replace the synthetic drug cypermethrin-EC that is currently in use.

Keywords: Acaricidal, cypermethrin-EC, infestation, medicinal plant, ticks, and *Tinospora cordifolia*

Introduction

Rajasthan's economy is driven by agricultural production, and animal husbandry is an important part of agriculture. Agriculture and animal husbandry engage the people of Rajasthan. Rajasthan ranks second in India in terms of livestock (10.60%) and second in milk production (14.51%). Rajasthan has a healthy livestock population. Ticks are pathogenic ectoparasites that are often found on cows. Ticks transfer many disease-causing germs and make milk dirty. When cows have infections of ticks, they lose blood, which can cause anemia, weight loss, frailty, less productivity, and less milk output. Because of this, the animal gets weak, and productivity goes down a lot. Ticks caused discomfort, sores, and secondary infections that hurt the animal's skin and hide quality. Ticks are known to spread infections that can kill cows, and they often have unforeseen effects.

Different acaricidal synthetic drugs are currently used for the control of ticks. Synthetic drugs are not easily available in some of the remotest rural areas and have some serious disadvantages, such as the development of drug resistance with continuous use, adverse drug reactions, or residual effects. The emergence of several problems related to synthetic drugs has encouraged researchers to search for new compounds that can improve the effectiveness of existing medications. The most commonly used *in vitro* acaricidal synthetic drug is cypermethrin emulsifiable concentrate (Cypermethrin-EC) against ticks (FAO, 2002; Kaplan, 2004; Rahmann and Seip, 2007) [23, 29, 37].

The Indian Institute of Agricultural Research and the Indian National Animal Health Research Center have also discovered the benefits and efficacy of herbal medicines in eliminating

Corresponding Author:

Dr. Gayatri Swarnakar

Professor, Department of
Zoology, Government Meera
Girls College, Mohan Lal
Sukhadia University, Udaipur,
Rajasthan, India

worms, pathogens, and parasites. Most of the published screening investigations are based on *in vitro* tests of different medicinal plants on species like *Ascaris*, *Ascaridia galli*, trematodes, and cestodes. Other researchers also observed effects of medicinal plants for controlling cow tick infestations, along with 28 plant species that may have acaricidal properties. A range of medicinal plants produce a number of bioactive phytochemicals with effective acaricidal actions. Many scientists screened the *in vitro* acaricidal effects of different indigenous medicinal plants against ticks to develop safer, cheaper, eco-friendly, and effective remedies for ruminants. The herbal plant *Tinospora cordifolia* (giloy) can be used to treat a multitude of ailments, such as viral infections, dengue fever, allergic rhinitis, and a fever that won't go away. The Indian system of medicine (ISM) uses the giloy plant to treat a wide range of diseases, such as diabetes, leprosy, skin problems, fever, diarrhea, and urinary problems. The *Tinospora cordifolia* plant possesses numerous medicinal, curative, restorative, therapeutic, and calming qualities.

(Shalaby *et al.*, 2012; Swarnakar *et al.*, 2014a & 2015a; Singh *et al.*, 2016; Ullah *et al.*, 2017; Anuracpreeda *et al.*, 2017; Damor and Swarnakar, 2018; Menaria *et al.*, 2020; Vanda *et al.*, 2020 a and b; Jogpal *et al.*, 2021; Kumar, 2021; Sen *et al.*, 2021; and Vishwakarma *et al.*, 2021; Li *et al.*, 2023; Alfaleh, 2025; Phaahla *et al.*, 2025 and Ullah *et al.*, 2025) [4, 6, 19, 27, 31, 33, 34, 35, 40, 41, 45, 49, 50, 53, 54, 55, 56, 57].

However, no research work has been carried out so far on the *in vitro* acaricidal effects of the medicinal plant *Tinospora cordifolia* (Neem Giloy) on pathogenic ticks. Therefore, it was decided to undertake the work on “*In vitro* acaricidal effect of medicinal plant *Tinospora cordifolia* on pathogenic ticks of domestic cows of the Sikar district.” The current research work would be significant because it will help to prepare affordable, environment-friendly, acaricidal, and veterinary herbal drugs to replace the synthetic drug cypermethrin-EC that is currently in use. The findings of the study will improve the socio-economic condition of the livestock farmers of the Sikar district.

Materials and Methods

- 1. Collection of plants and authentication:** *Tinospora cordifolia* stems were collected from Sikar, Rajasthan. The plant *Tinospora cordifolia* was identified and authenticated by Professor Asha Arora, Department of Biotechnology, B. N. University, Udaipur (Raj.). The herbarium sheet was prepared and deposited in the department for future reference, with the accession numbers BNU/BIOT/2021-22/1136 and BT/2021-22/B 123-1 (Plate 1; Figs. 1 and 2).
- 2. Collection and identification of ticks:** Live ticks were collected from infected domestic cows from different tehsils in randomly selected villages in the Sikar district of Rajasthan. After removing the ticks carefully from the infected cows, they were again washed several times in physiological saline. These ticks were kept in 0.7% physiological saline for identification and investigations. Species of the ticks were identified with the help of a stereomicroscope according to the description and key mentioned in the reference book (Soulsby, 1982 and Walker *et al.*, 2003) [47, 58] (Plate 1; Figs. 3, 4, 5 and 6).
- 3. Experimental design:** Acaricidal activity was studied by the *in vitro* Petri dish method as described by Githiori *et al.* (2006). After thorough washing with a physiological saline solution (0.7% NaCl), they were divided into five

groups. At room temperature, twelve ticks were taken for each group in Petri dishes: 1. The first group (Identification of ticks), 2. The second group (control ticks), 3. The third group: *in vitro* treatment with synthetic drug cypermethrin-EC, 4. The fourth group: *in vitro* treatment of aqueous extracts of medicinal plant *Tinospora cordifolia* stem, and 5. The fifth group: *in vitro* treatment of alcoholic extracts of medicinal plant *Tinospora cordifolia* stem.

- 4. Evaluation of the acaricidal effect of the synthetic drug cypermethrin-EC and the aqueous and alcoholic extract of medicinal plant *Tinospora cordifolia*:** 10 ml of each concentration of the acaricidal extracts and synthetic drug were applied to a group of 12 ticks maintained in 10 ml of selected medium and 2 ml of the sterilizing solution. The present experiment was performed three times at the perfect pH of 7.4 and temperature of 37 °C. All experimented ticks were examined after 1, 2, 3, 4, and 5 hours; mortality was calculated for each experiment. Mortality was determined visually by activity and by mechanical stimulation using a dissecting needle after 1, 2, 3, 4, and 5 hours, and tick mortality was evaluated by observation under a magnifying glass or after being removed from the experimental medium and dipped in slightly warm water, and on gentle stimulation, ticks were confirmed by mortality. The motility of the ticks was scored by using the following criteria

Score 3: Movement of the whole-body ticks

Score 2: Movement of only parts of the body ticks

Score 1: Immobile but not dead

Score 0: Dead

- 5. Statistical analysis:** The dead ticks were counted in each experimental set, and the percentage of average mortality was calculated in all experiments according to the following equation

$$\text{Average Mortality Rate} = \frac{\text{Total number of dead ticks}}{\text{Total number of experimental ticks}} \times 100$$

All values were expressed as mean.

Results

Tick infestations were observed in domestic cows of all randomly selected villages in all nine tehsils of Sikar district in the period of March 2022 to February 2025. The tick species were identified by comparing important morphological characters such as scutum pattern, spiracle plate, coxa structure, adanal plates, and capitulum shape of different species. Two species of ticks, such as *Hyalomma anatolicum* and *Rhipicephalus microplus* (*Boophilus microplus*) (Plate 1; Figs. 5 and 6), were identified. The present research work has studied the effect of cumulative concentrations of both aqueous and alcoholic extracts from the most effective plant, *Tinospora cordifolia* stem, on pathogenic ticks in domestic cows.

Untreated pathogenic ticks

Pathogenic ticks were collected carefully from different body parts of domestic cows and subsequently washed multiple times under tap water. After washing, they were transferred into saline solution having dissolved glucose so that ticks would be alive during the experimental procedure of about 08-10 hours. Pathogenic ticks remained actively in mobile

condition with whole-body movement through the study period of 1 hr to 5 hr.

***In vitro* acaricidal effect of different concentrations of the synthetic drug cypermethrin-EC on ticks**

Different concentrations of the synthetic drug cypermethrin-EC show an acaricidal effect and healing effect against ticks, as shown in Table 1 and Graph 1. Cypermethrin-EC was most effective against ticks, where it exhibited a 75% mortality rate, and a coefficient of variation of 0% was revealed at a high concentration of 50 mg/ml in 5 hours of exposure time. The lowest mortality rate was 2.78%, and a coefficient of variation of 174.84% was observed in the 20 mg/ml concentration at 1 hour's exposure time. A lower concentration of permethrin was allowed to survive the ticks (Table 1 and Graph 1).

***In vitro* acaricidal effect and healing effect of different concentrations of aqueous *Tinospora cordifolia* against pathogenic ticks**

The acaricidal effect of the aqueous concentration of *Tinospora cordifolia* has been shown in Table 2 and Graph 1. In this experiment, aqueous extracts of *T. cordifolia* resulted in a high mortality rate of 100%, and a 0% coefficient of variation was achieved with these extracts at concentrations of 40 mg/ml and 50 mg/ml after 5 hours of exposure. The aqueous extract concentrations of 10 mg/ml, 20 mg/ml, and 30 mg/ml resulted in mortality rates of 80.56%, 86.11%, and 91.67%, respectively, after 5 hours of exposure; this mortality

also induced paralysis in the experimental ticks, bringing them close to death. A mortality rate of 75% was observed at a 50 mg/ml concentration after 4 hours of exposure. The lowest mortality rate was 2.78%, and a coefficient of variation of 174.84% was observed in the 10 mg/ml concentration at 1 hour's exposure time (Table 2 and Graph 1).

***In vitro* acaricidal effect of different concentrations of alcoholic stem extracts of *Tinospora cordifolia* on ticks**

The acaricidal and healing effects of *Tinospora cordifolia* alcoholic concentration are represented in Table 3 and Graph 1. The complete mortality rate of 100% is observed from dose concentrations of 20 mg/ml after 4 hours of exposure time onwards. The 10 mg/ml dose concentration also resulted in a significant mortality rate of 94.44% after 4 hours of exposure. All the dose concentrations resulted in a 100% mortality rate at a 5-hour exposure period. The lowest mortality of 5.56% appears at the concentration of 10 mg/ml after 1 hour (Table 3 and Graph 1).

The extract of *Tinospora cordifolia* killed 100% of pathogenic ectoparasite ticks at dose concentrations of 20 mg/ml, 30 mg/ml, 40 mg/ml, and 50 mg/ml after 4 hours of *in vitro* exposure time. The alcoholic extracts of *Tinospora cordifolia* have higher acaricidal and healing effectiveness than the aqueous extracts and synthetic drug cypermethrin-EC. The cypermethrin-EC drug was observed to be least effective in comparison with plant extracts, particularly in terms of its acaricidal properties and overall efficacy against ticks (Graph 1).

Table 1: *In vitro* acaricidal effects of different concentrations of the synthetic drug cypermethrin-EC on ticks

Exposure time in hours	Cypermethrin-EC concentration in mg/ml	No. of dead ticks		Mortality rate in%	CV%
		Mean	± STD		
1 hr	10 mg/ml	0.00	0.00	0.00	0.00
	20 mg/ml	0.33	0.57732	2.78	174.8484
	30 mg/ml	0.67	0.57732	5.56	86.1194
	40 mg/ml	1.33	0.57732	11.11	43.3834
	50 mg/ml	1.67	0.57732	13.89	34.5508
2 hr	10 mg/ml	1.33	0.57732	11.11	43.3834
	20 mg/ml	2.00	0.00	16.67	0.00
	30 mg/ml	2.67	1.1546	22.22	43.2434
	40 mg/ml	3.33	0.57732	27.78	17.3363
	50 mg/ml	4.33	0.57732	36.11	13.3325
3 hr	10 mg/ml	4.00	0.00	33.33	0.00
	20 mg/ml	4.67	0.57732	38.89	12.3618
	30 mg/ml	5.00	1.00	41.67	20.00
	40 mg/ml	5.33	0.57732	44.44	10.8311
	50 mg/ml	6.00	1.00	50.00	16.6666
4 hr	10 mg/ml	5.33	1.1546	44.44	21.6622
	20 mg/ml	5.67	0.57732	47.22	10.1816
	30 mg/ml	6.33	0.57732	52.78	9.1200
	40 mg/ml	6.67	0.57732	55.56	8.6551
	50 mg/ml	7.33	0.57732	61.11	7.8758
5 hr	10 mg/ml	7.00	0.00	58.33	0.00
	20 mg/ml	7.67	0.57732	63.89	7.5267
	30 mg/ml	8.00	0.00	66.67	0.00
	40 mg/ml	8.33	0.57732	69.44	6.9303
	50 mg/ml	9.00	0.00	75.00	0.00

Table 2: *In vitro* acaricidal effect of different concentrations of aqueous stem extracts of *Tinospora cordifolia* on ticks

Exposure time in hours	<i>T. cordifolia</i> aqueous concentration in mg/ml	No. of dead ticks		Mortality rate in%	CV%
		Mean	± STD		
1 hr	10 mg/ml	0.33	0.57732	2.78	174.8484
	20 mg/ml	1.00	0.00	8.33	0.00
	30 mg/ml	1.33	0.57732	11.11	43.3834
	40 mg/ml	2.00	0.00	16.67	0.00
	50 mg/ml	2.67	0.57732	22.22	21.6224
2 hr	10 mg/ml	3.00	1.00	25.00	33.3333
	20 mg/ml	3.67	0.57732	30.56	15.7302
	30 mg/ml	4.00	1.00	33.33	25.00
	40 mg/ml	4.67	0.57732	38.89	12.3618
	50 mg/ml	5.00	0.00	41.67	0.00
3hr	10 mg/ml	4.67	0.57732	38.89	12.3618
	20 mg/ml	5.00	1.00	41.67	20.00
	30 mg/ml	5.67	0.57732	47.22	10.1816
	40 mg/ml	6.00	1.00	50.00	16.6666
	50 mg/ml	6.67	0.57732	55.56	8.6551
4 hr	10 mg/ml	6.33	0.57732	52.78	9.1200
	20 mg/ml	7.33	0.57732	61.11	7.8758
	30 mg/ml	8.00	0.00	66.67	0.00
	40 mg/ml	8.33	0.57732	69.44	6.9303
	50 mg/ml	9.00	0.00	75.00	0.00
5 hr	10 mg/ml	9.67	0.57732	80.56	5.9700
	20 mg/ml	10.33	0.57732	86.11	5.5885
	30 mg/ml	11.00	0.00	91.67	0.00
	40 mg/ml	12.00	0.00	100.00	0.00
	50 mg/ml	12.00	0.00	100.00	0.00

Table 3: *In vitro* acaricidal effect and healing effect of different concentrations of alcoholic stem extracts of *Tinospora cordifolia* on ticks

Exposure time in hours	<i>T. cordifolia</i> alcoholic concentration in mg/ml	No. of dead ticks		Mortality rate in%	CV%
		Mean	± STD		
1 hr	10 mg/ml	0.67	0.57732	5.56	86.1194
	20 mg/ml	1.33	0.57732	11.11	43.3834
	30 mg/ml	2.33	0.57732	19.44	24.7639
	40 mg/ml	3.33	0.57732	27.78	17.3363
	50 mg/ml	4.33	0.57732	36.11	13.3325
2 hr	10 mg/ml	3.00	0.00	25.00	0.00
	20 mg/ml	4.00	0.00	33.33	0.00
	30 mg/ml	5.00	0.00	41.67	0.00
	40 mg/ml	6.33	0.57732	52.78	9.1200
	50 mg/ml	7.33	0.57732	61.11	7.8758
3 hr	10 mg/ml	7.67	0.57732	63.89	7.5267
	20 mg/ml	8.33	0.57732	69.44	6.9303
	30 mg/ml	9.33	0.57732	77.78	6.1875
	40 mg/ml	10.00	0.00	83.33	0.00
	50 mg/ml	10.67	0.57732	88.89	5.4104
4 hr	10 mg/ml	11.33	0.57732	94.44	5.0953
	20 mg/ml	12.00	0.00	100.00	0.00
	30 mg/ml	12.00	0.00	100.00	0.00
	40 mg/ml	12.00	0.00	100.00	0.00
	50 mg/ml	12.00	0.00	100.00	0.00
5 hr	10 mg/ml	12.00	0.00	100.00	0.00
	20 mg/ml	12.00	0.00	100.00	0.00
	30 mg/ml	12.00	0.00	100.00	0.00
	40 mg/ml	12.00	0.00	100.00	0.00
	50 mg/ml	12.00	0.00	100.00	0.00

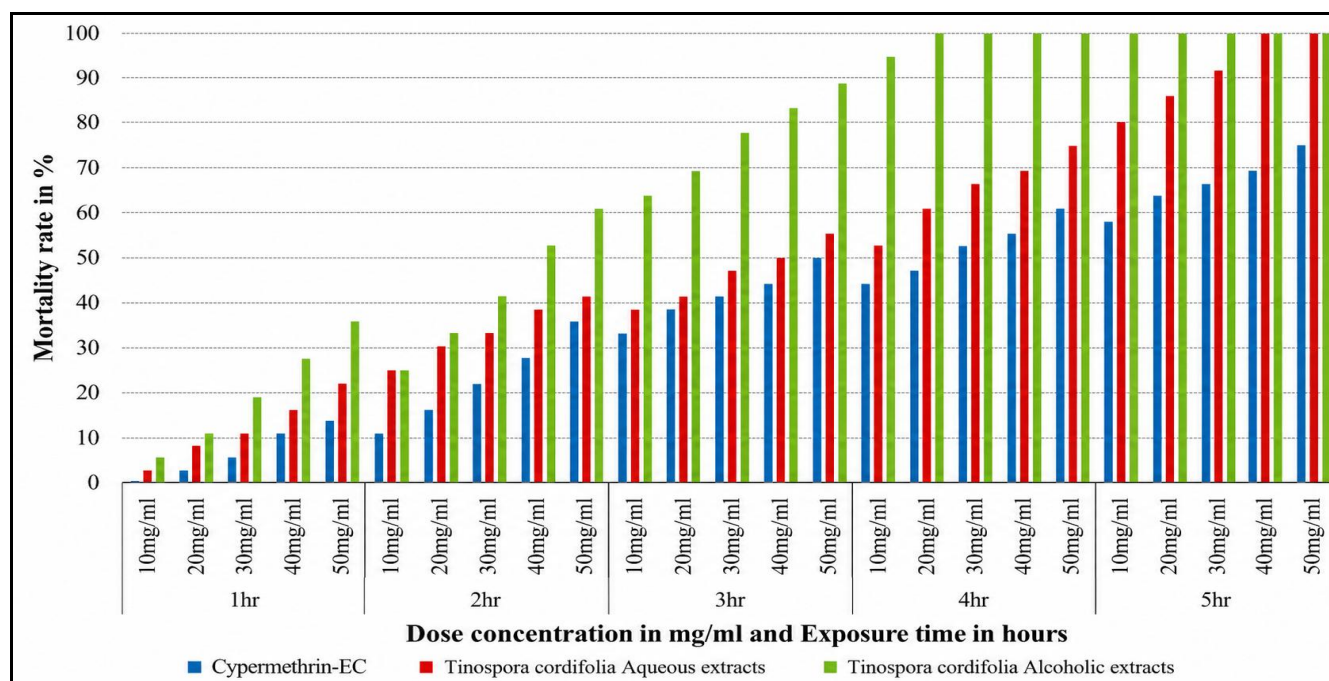


Fig 1: Graphical representation of acaricidal effect and healing effect activity of aqueous and alcoholic extracts of *Tinospora cordifolia* with comparison to the synthetic drug, Cypermethrin-EC, on pathogenic ticks

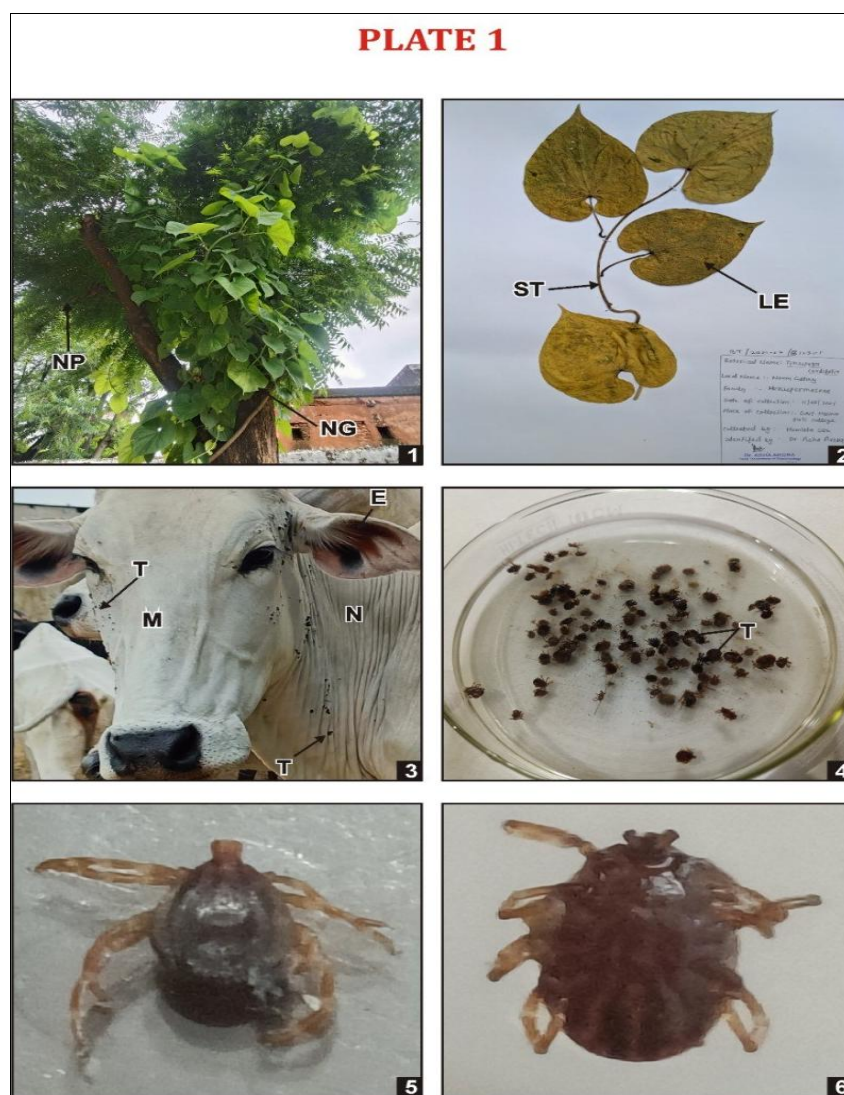


Fig 2: Explanation of Photographic Plate - 1: 1. Medicinal plant Neem giloy (NG) (*Tinospora cordifolia*) vine climbing on Neem plant (NP) (*Azadirachta indica*); 2. Identification of *Tinospora cordifolia* (Neem giloy) showing leaf (LE) and stem (ST); 3. Infestation of pathogenic ticks (T) on the mouth (M), ear (E), and neck (N) of domestic cows (*Bos indicus*); 4. Pathogenic ticks (T) present in saline solution; 5. Photograph of the pathogenic tick *Hyalomma anatolicum*; and 6. Photograph of pathogenic tick *Rhipicephalus (Boophilus) microplus*

Discussion

In the present study, the acaricidal effects of the cypermethrin-EC drug and alcoholic and aqueous extracts of *Tinospora cordifolia* stems were evaluated on the pathogenic ticks. *In vitro* studies to evaluate the acaricidal and healing effects of plant extracts exhibited dose-dependent mortality, paralyzing or causing death within the incubation period on ticks. Results were compared with those of the cypermethrin drug at different concentrations. Cypermethrin-EC drugs cause low motility, and the alcoholic extract from medicinal plants is stronger than the water extract.

Ticks are involved in the transmission of disease-causing pathogens affecting humans, animals, and domestic cows. From the early days to combat tick species, various groups of synthetic acaricides have been used from time to time. The enhanced accessibility, visible efficacy, and easy administration of these acaricides via handheld sprayers, immersion tanks, spot-on, pour-on, injection, and chemical-laden collars are the primary preference of livestock owners across agricultural and livestock sectors (Holdsworth *et al.*, 2006; De *et al.*, 2008 and Beugnet & Franc, 2012) ^[11, 20, 26]. However, their indiscriminate usage has contributed to the development of resistance among tick populations worldwide, leading to reduced efficacy of these treatments and necessitating the exploration of alternative control methods. Additionally, owing to the negative effects of chemical acaricides on the environment, there is a need to develop non-chemical measures for the management of ticks, such as the use of plant extracts, biological control agents, and integrated pest management strategies. Historically, extracts made from different sections of plants have been used to manage ticks, and they constitute an important part of traditional medicine in many countries. Acaricidal activity of different extracts from diverse plant species has been reported against ticks (Adenubi *et al.*, 2016; Atanasov *et al.*, 2015; Katz and Baltz, 2016; Benelli *et al.*, 2017 and Dzemo *et al.*, 2022) ^[2, 7, 10, 22, 30]. Organic solvents may be more effective in acaricidal bioassays (Adenubi *et al.*, 2016) ^[2] as the tick's cuticle, which is primarily composed of wax externally and proteins internally, can be better penetrated by non-polar chemical compounds (Chagas *et al.*, 2002) ^[18]. Similar findings were demonstrated by Ravindran *et al.* (2011) ^[38], who concluded that the polarity of the solvent is inversely related to the acaricidal effects. An effective sustainable tick management strategy involves targeting the juvenile stages of ticks to disrupt their life cycle. This facilitates the management of infestations during favorable weather conditions. Adenubi *et al.* (2018) ^[1] say that some of the best medicinal plants are used for keeping pests away. Their eggs only hatch 90% of the time, which kills many ticks. Azadirachtin is a bioactive chemical made from the fruits of *Azadirachta indica*, commonly known as the neem tree, and *Melia azedarach*, also known as the chinaberry tree. *Azadirachta indica* (commonly known as neem) and *Melia azedarach* (also known as chinaberry) fruit extracts are the sources of the bioactive compound azadirachtin. It prevents tick eggs from developing and molting (Gareh *et al.*, 2022) ^[24]. This indicates that *A. indica* extracts, utilized as food additives, may have practical implications in tick management for both public health and veterinary objectives (Pohlit *et al.*, 2011) ^[36]. One significant limitation in the research on the development of antitick products is the absence of a standardized testing protocol (Adenubi *et al.*, 2018) ^[1]. A significant variation in testing methodologies, evaluation time, the tick species, and the concentrations of active

ingredients in crude extracts, fractions, or the solvents utilized was reported. The disparities complicate the comparison of results across different studies, and the issue was previously highlighted (Bissinger & Roe, 2010; Benelli *et al.*, 2017; Adenubi *et al.*, 2018 and Benelli *et al.*, 2018) ^[1, 9, 10, 15]. As in many other areas of drug development research, translating laboratory efficacy into field conditions is one of the main obstacles in natural product development research (Borges *et al.*, 2011) ^[16]. Achieving significant efficacy and adequate residual activity in field conditions presents new challenges, as most of the studies on the acaricidal activity of various plant species are conducted *in vitro* (De *et al.*, 2012). Additionally, the literature reviewed primarily focused on determining the mechanism of action of the plant extracts or isolated compounds. The development of herbal medicinal products: Quality, safety, and efficacy as key factors are important properties and sources of acaricidal and healing effects in domestic animals (Caniguel *et al.*, 2008 and Bisht *et al.*, 2025) ^[14, 17].

The plant is also a beneficial source of micronutrients such as calcium, iron, phosphorus, manganese, zinc, and copper. *T. cordifolia* will help in promoting and popularizing the health benefits of this plant and has the potential to control various ailments, such as inflammation, diabetes, and respiratory issues. *T. cordifolia* has been used to treat various diseases like inflammation, chronic cough, and respiratory distress. The present findings align with other observations of scientists regarding the *in vitro* acaricidal properties of herbal plants (Sharma *et al.*, 2012; Sonkamble *et al.*, 2015; Dhama *et al.*, 2016; Alsuhaibani and Khan, 2017; Bharathi *et al.*, 2018; Tiwari *et al.*, 2018; Sharma *et al.*, 2019 and Saeed *et al.*, 2019; Sharma *et al.*, 2019; Kumari *et al.*, 2020; Shree *et al.*, 2020; Srivastava, 2020; Ahmed, 2021; Balkrishna *et al.*, 2021; Bharadwaj *et al.*, 2024; Joshi *et al.*, 2024 and Bisht *et al.*, 2025) ^[3, 5, 8, 12, 14, 21, 28, 32, 39, 42, 43, 44, 46, 48, 52].

The present studies on the *in vitro* effects of *Tinospora cordifolia* against ticks elucidated the acaricidal and healing effects based on visual and physical observations of tick mortality; it was found that *T. cordifolia* is effective against ticks. The study indicated that aqueous and alcoholic extracts of *T. cordifolia* caused more mortality than the synthetic drug cypermethrin-EC, and higher concentrations were more effective than lower concentrations. It was also noted that aqueous extracts were less strong than alcoholic extracts.

Conclusion

The present study is highly significant for the medico-veterinary field. Findings may help to initiate pharmacological aspects of the extracts of *Tinospora cordifolia* herbal plants to prepare eco-friendly, less costly, acaricidal, healing, and synthetic veterinary drugs. The current study will improve the socio-economic condition of the domestic cow farmers and livestock holders of the Sikar district by removing the pathogenic ticks with the treatment of the most effective medicinal plant, *T. cordifolia*. The plant extract of *T. cordifolia* causes higher mortality in ticks compared to the synthetic drug cypermethrin-EC.

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Conflicts of Interest: The author declares no conflict of interest.

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