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Review

Tick Infestation in Poultry

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ABSTRACT

This paper reviews the studies on the prevalence, vector role, chemotherapy and biological control of ticks in poultry. Ticks of the genus Argas are the most prevalent. Ticks were reported to transmit bacterial, viral and parasitic diseases to poultry. The most important and frequently transmitted disease was found to be the spirochaetosis. A variety of chemicals are used for the control of tick infestation in poultry. These include carbamates, pyrethroids, herbal products, organophosphates and ivermectins. The most promising results, however, were reported with pyrethroids and organophosphates. Biological control although have not widely accepted for application, yet some bacterial and fungal species have been found to be effective. Based on the review, conclusions have been drawn for further research into the tick infestation of poultry.

Key Words: Ticks; Poultry

INTRODUCTION

The ectoparasites of poultry like ticks, lice and mites play an important role in the transmission of certain pathogens which cause heavy economic losses to poultry industry. They cause heavy morbidity by sucking blood and causing irritation to the birds which adversely affects the economical production of poultry (Phulan *et al*., 1984). Ectoparasites cause weight loss at the rate of about 711 g per bird and decrease the egg yield at the rate of about 66 eggs per bird in a year (Elkifl *et al*., 1973). Among ectoparasites, fowl ticks may cause ruffled feathers, anaemia, emaciation and lowered production. Heavy tick infestation may cause loss of blood leading to anemia and eventually death (Bergstrom *et al*., 1999). In addition, they are also known to transmit certain parasitic, bacterial and viral diseases like leucocytozoonosis, Aegyptianellosis, Pasteurellosis, Avian encephalomyelitis, Borreliosis and fowl cholera (Permin & Hansen, 1998). Larval forms of these ticks also cause paralysis (Rosenstein, 1976). The purpose of this paper is to review the studies on tick infestation in poultry and associated risks.

Prevalence. There are a number of species of ticks infesting poultry. These include *Argas persicus* (Fahmy, 1952; Reid, 1956; Frolov *et al*., 1972; Petrov, 1972; Akhundova & Terskikh, 1972; Galun *et al*., 1972; Elkifl *et al*., 1973; Stefanov *et al*., 1975; Leeflang & Ilemobade, 1977; Glukhov & Noviko, 1978; Gryaznova *et al*., 1978; Kachekova & Frolov, 1978; Orichova *et al*., 1978; Buriro & Akbar, 1978; Frolov *et al*., 1978; Sluda *et al*., 1979; Soni, 1979; Buriro, 1979; Sokolov *et al*., 1980; Li & Yarnykh, 1981; Hafeez & Irfan, 1982; Gyurov, 1983; Buriro, 1983; Ayeni *et al*., 1983; Phulan *et al*., 1984; Frolov *et al*., 1985; Khan *et al*., 1986; Abdu, 1987; Soliman *et al*., 1988; Dikaev, 1988; Okaeme, 1988; Karim *et al*., 1988; Mousa *et al*., 1988; Pavlovic *et al*., 1988; Tian & Guan, 1989; Oyoun *et al*., 1990; Pavlovic & Nesic, 1991; Sheikh, 1991; Kumar *et al*., 1992; Mir *et al*., 1993; Chhabra & Donora, 1994; Saidu-l *et al*., 1995; Kulisic *et al*., 1995; Hassanain *et al*., 1997; Axtell, 1999; El-Kady *et al*., 1999; El-Kammah *et al*., 2001; Habeeb *et al*., 2001; Keirans & Durden, 2001; Khan, 2001; Permin *et al*., 2002), *Argas robertsi* (Hoogstraal *et al*., 1968), *Argas (Persicargas) zumpti* (Hoogstraal *et al*., 1968), *Argas giganteus* (Kohls & Clifford, 1968), *Argas himalayensis* (Hoogstraal & Kaiser, 1973), *Argas (Persicargas) nullarborensis* (Hoogstraal & Kaiser, 1973), *Argas polonicus* (Sluda *et al*., 1979), *Argas africolumbae* (Kraiss & Gothe, 1982), *Argas walkerae* (Norval, 1985), *Argas reflexus* (Dikaev, 1988 & Kulisic *et al*., 1995), *Argas vulgaris* (Dikaev, 1988), *Argas hermanni* (Oyoun *et al*., 1990), *Argas monolakensis* (Schwan *et al*., 1992), *Argas miniatus* (Evans *et al*., 2000), *Argas arboreus* (Belozerov *et al*., 2003), *Ixodes ricinus* (Bernard & Bieseman, 1986), *Amblyomma variegatum* (Okaeme, 1988), *Ixodes columnae*, *I. persulcatus*, *I. turdus*, *Haemaphysalis flava* and *H. longicornis* (Ishiguro *et al*., 1997), *Ixodes auritulus* (Evans *et al*., 2000), *Amblyomma americanum* (Durden *et al*., 1997; Kinsey *et al*., 2000; Mock *et al*., 2001), *Amblyomma macuolatum*, *Haemaphysalis leporispalustris*, *Ixodes brunneus*, *I.minor* and *I. scapularis* (Durden *et al*., 1997 and Kinsey *et al*., 2000), *Amblyomma tigrinum* (Labrun *et al*., 2002), *Amblyomma triste* (Labruna *et al*., 2003), *Haemaphysalis punctata*, *Hyalomma lusitanicum* and *Ixodes frontalis* (Calvete *et al*., 2003) and *Amblyomma aureolatum* and *Ixodes auritulus* (Arzua *et al*., 2003).

The prevalence of tick infestation varies in different months/seasons of the year. It is found highly prevalent in, December, May (Elkifl *et al*, 1973), April to November (Sluda *et al*., 1979), August (Phulan *et al*., 1984), September to November (Anjum, 1990), summer and spring (Oyoun *et*

al., 1990), spring (Ishiguro *et al*., 1997) and April (Pavlovic *et al*., 1988). It is low in, July and August (Elkifl *et al*., 1973), winter (Sluda *et al*., 1979), January (Phulan *et al*., 1984), winter (Oyoun *et al*., 1990) and autumn (Ishiguro *et al*., 1997).

The optimum temperature for the development of *A. persicus* is 22-38°C (Petrov & Gecheva, 1975) and for A. africolumbae 27°C (Kraiss & Gothe, 1982). The developmental cycle of *A. persicus* is completed in 41-133 days (Petrov & Gecheva, 1975 and Srivastava *et al*., 1981) and 13-38 days at room temperature and humidity (Orichova *et al*., 1978).

Tick infestation varies with different breeds of poultry. It is more in Harco and least in Babcock (Ugochukwu & Omije, 1986).

Vector role of ticks. Ticks transmit bacterial, rickettsial, viral, and parasitic and spirochaetal diseases in poultry. *A. persicus* transmits Salmonella pullorum (Stefanov *et al*., 1975), Mycoplasma gallisepticum (Glukhov & Novikov, 1978 and Soliman *et al*., 1988), *Mycoplasma meleagridis* (Soliman *et al*., 1988), *Salmonella gallinarum* (Gyurov, 1983), *Aegyptianella pullorum* (Leeflang & Ilemobade, 1977 and Tsanov, 1983), Avian encephalomyelitis and Leucocytozoonosis (Permin & Hansen, 1998), West Nile virus (Abbassy *et al*., 1993) and *Borrelia anserina* (Leeflang & Ilemobade, 1977; Rodey & Soni, 1977; Buriro, 1979; Hafeez & Irfan, 1982; Khan *et al*., 1986; Abdu, 1987; Nemova *et al*., 1990; Rashid & Ali, 1991; Sa-idu-L *et al*., 1995; Ishiguro *et al*., 1997; Bhatti *et al*., 2001; Durden *et al*., 2001). *Argas persicus* harbours different types of bacteria including those of genus Salmonella, Aerobacter, Escherichia, Proteus, Staphylococcus, Flavobacterium, Bacillus, Pseudomonas and Streptococcus (Buriro, 1983). *Argas persicus* infestation causes paralysis in birds (Rosenstein, 1976; Gryaznova *et al*., 1978; Soni, 1979). *Argas persicus* larvae have been responsible for simultaneous occurrence of Infectious Bursal Disease and Spirochaetosis (Abdu, 1987). The ticks, *Amblyomma americanum*, *A. maculatum*, *Haemaphysalis leporispalustris*, *Ixodes brunneus*, *I. Minor* and *I. scapularis* transmit *Borrelia burgdorferi* (Durden *et al*., 1997; Slowik & Lane, 2001). Migratory birds are able to carry Lyme disease Borreliosis (*Borrelia burgdorferi*) as a latent infection for several months and this infection can be reactivated and passed on to Ixodid ticks as a result of migratory restlessness thus causing further transmission through ticks (Gylfe *et al*., 2000; Kaiser *et al*., 2002).

Chemotherapy. A variety of chemicals are used for the control of tick infestation in poultry either by application to the birds or poultry houses. These include topical application of N, N- diethyl- 2-phenylacetamide (DEPA), N, N- diethyl –3- methyl benzamide (DEET) and Dimethyl phthalate (DMP). DEET and DEPA are more effective (Kumar *et al*., 1992), feeding of chicks with 100 fg Ivermectin per kg body weight (Mousa *et al*., 1988), dipping of tick infested chicken legs in 0.05% deltamethrin (Tian & Guan, 1989), bromocyclen spray to the birds and treatment of their houses with 0.6% bromocyclen (Pavlovic *et al*., 1988), topical application of 1:20 dilution of pestoban (a liquid concentrate of various non –poisonous plants) (Sinha *et al*., 1987), application of 0.5% trichlorfon, 0.25% crotoxyphos or 0.25% carbaryl @ 25-50 mL per bird and spraying the poultry houses with 1-2% trichlorfon, 0.25% diazinon, 0.02% dichlorvos, 0.5% crotoxyphos, 0.1% carbaryl or 0.25% dicresyl (Frolov *et al*., 1985), phosalone, tetrachlorvinphos, porpoxur and fenethacarb (Frolov *et al*., 1978), application of 1-1.5% ftalofos (phosmet) to poultry houses at the rate of 150–200 mL/sq.m (Frolov *et al*., 1972), ectocide, a preparation containing 10 g of pyrethrins, 15 g piperonyl butoxide, 3 g benzalkonium chloride and water to make 100 g (Li & Yarnykh, 1981), Aerosol of 2% "4 – 74" (carbamate preparation) (Sokolov *et al*., 1980) and pyrethroids (bioallethrin, biopresmetrin, neo – pinamin and pybuthrin) (Kachekova & Frolov, 1978).

Biological control. Biological control of tick infestation in poultry includes, the cessation of egg laying by females of *A. persicus* after exposure to irradiation (Galun *et al*., 1972), Entobakterin and Dendrobacillin (preparations of spores and endotoxin of *Bacillus thuringiensis*) and Boverin (conidiospores of the fungus *Beauvaria bassiana*), active alone or in combination with chemical pesticides in the control of arthropods (Frolov, 1974) and activity of *Bacillus thuringiensis* against *A. persicus* (Hassanain *et al*., 1997).

CONCLUSION

This review suggests different epidemiology of tick infestation in various areas. Therefore, investigations on epidemiological aspects of tick infestation in poultry in Pakistan should be carried out to devise an effective control.

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