

***Argas persicus* infestation in domestic pigeons of Kashmir valley – prevalence and pathology**

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Abstract

The present investigation was designed to have firsthand information of the prevalence of the tick *Argas persicus* in the domestic pigeons (*Columba livia domestica*) of Kashmir valley and the skin pathology associated with the infestation of this tick as it sucks blood from the host. This study was carried out for a period of two years from February 2019 to January 2021. During the study monthly prevalence as well as seasonal prevalence of the tick *Argas persicus* was recorded and the infested tissue was preserved for histopathological studies. This study clearly reveals high prevalence of the tick infestation during summer season and lowest prevalence during winter season. This study also highlights the extent of damage caused by this tick to the skin of host during their penetration of capitulum inducing profuse local immunological response by the infested tissue in the form of infiltration of polymorphonuclear cells at the infested sites.

Key words : *Argas persicus*, prevalence, pathology, domestic pigeons, Kashmir.

The external parasites of poultry birds produce losses by sucking blood resulting in weakness and cause irritation resulting in reduced production of eggs^{10,11}. Among the external parasites, tick infestation causes heavy blood loss which may lead to anemia and death. *Argas persicus* burden was found to be about 3.25 per bird and a single tick sucked 18.57 ml blood daily and thus 60.0 ml of blood is sucked by ticks per bird daily⁵. *Argas persicus* life

cycle involves one larval and at least two nymphal stages prior to adult. Ticks, living in the cracks and crevices of bird enclosures approach birds at night to suck blood. Thus, this tick acts as a major ectoparasite of domestic pigeons which are raised in enclosures. *Argas persicus* transmits *Borrelia anserina* which is the causative agent of fowl Spirochaetosis¹⁴. Considering the economic importance of this most common tick of birds,

the present study was carried out to have an idea of the prevalence of *Argas persicus* among the domestic pigeons raised in different parts of Kashmir valley and also study the tissue pathology associated with the infestation of this tick as it penetrates deep into the skin of the host birds to suck blood.

In the present study, a total of 240 domestic pigeons purchased from pigeon fanciers from different regions of Kashmir valley were screened for the prevalence of *Argas persicus*. About 10 birds were screened every month of the study for these ectoparasites. Ticks and their larval stages were collected from the birds and kept in glass jar for 6 to 24 hours before being placed in a container having 70% alcohol. About ten (10) ticks randomly selected were boiled in distilled water for 10 minutes, and then dipped in 10% KOH solution. Ascending order of Alcohol was used for dehydration purpose. Ticks were passed through different grades of alcohol, viz., 30, 50, 70, 92 and 100% (absolute). The ticks were kept for 30 minutes in each grade to dehydrate them and are finally mounted using DPX (Soulsby, 1982). Identification of ticks was done on the basis of their taxonomic characteristics¹². Morphological features used in tick identification were: size of tick, shape of body, position of head and mouthparts (capitulum) relative to the thorax and abdomen on dorsal and ventral sides¹². Prevalence was calculated as a percentage of the host population infected at a point in time¹⁵. Mean intensity was calculated as number of parasites per infested bird. Mean intensity of infestation was calculated as number of parasites per bird.

For histological studies, fragments of the parasitized skin were removed and

immediately fixed in formalin. The material was then routinely processed¹ for paraffin embedding. Sectioning was done using Rotary microtome cutting 5µm sections which were then stained with hematoxylin and eosin (H&E). Micrographs were obtained using digital microscope model BX60F-3, Olympus Optical Co. Ltd. (Tokyo, Japan), fitted with the Olympus camera model DP12.

The present study was carried out from February 2019 to January 2021 on a sample size of 240 domestic pigeons collected from different regions of Kashmir valley. Season wise study of prevalence of *Argas persicus* revealed that during Spring (Feb, March, April) prevalence of infestation was 6.6% and during the Summer (May, June, July) prevalence of this tick was found to be 16.6%. Least tick infestation of only 3.8% was recorded during autumn (Aug, Sep, Oct) and no infestation was recorded in Winter (Nov, Dec, Jan) seasons of both the years of study (Figure 1). Month-wise prevalence study revealed higher infestation rates during May, June and July month of both years of the study (Figure 2). Mean intensity of infestation was found to be 15±3.5.

Gross pathological studies revealed deeper penetration of ticks into the skin resulting in the raised and centrally pitted lesions (Figure 4). The lesions can be sometimes so deep that even the underlying bones are exposed (Figure 5). Histological studies of the infested cutaneous tissues reveal clear penetration of capitulum of tick deeper into the skin to suck the blood resulting in strong immunological response by the tissue in the form of infiltration of polymorphonuclear

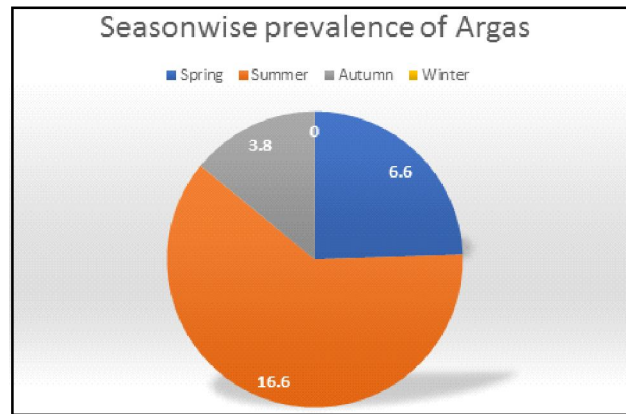


Fig. 1. Season wise prevalence of *Argas persicus*

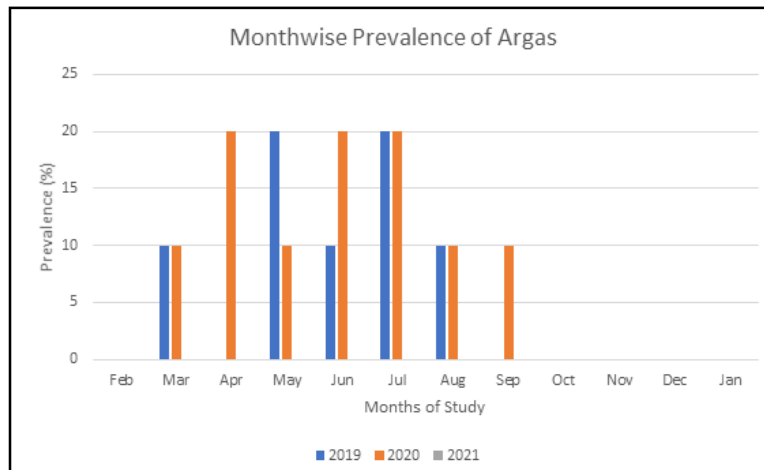


Fig. 2. Month wise prevalence of *Argas persicus*

lymphocytes containing acidophilic granules. Mononuclear cells and mast cells and, in lesser numbers, basophils were also seen at skin attachment sites. (Figure 6).

Infestation of ticks during spring may be attributed to the increased rainfall and moisture and higher prevalence rates during summer may be attributed to higher temperature which lowers the resistance of birds and facilitates moulting of arthropod

parasites. Phulan *et al.*,¹¹ recorded the highest rate of tick infestation in poultry during August and this rate is positively correlated with temperature as compared to humidity. According to Nosek *et al.*⁹ the larvae of *A. persicus* moulting occurs chiefly in July and August while ticks develop and reproduce during warm season. Lesser overall prevalence in the present study compared to previous studies on poultry birds is due to the fact that only ticks present on the body of the

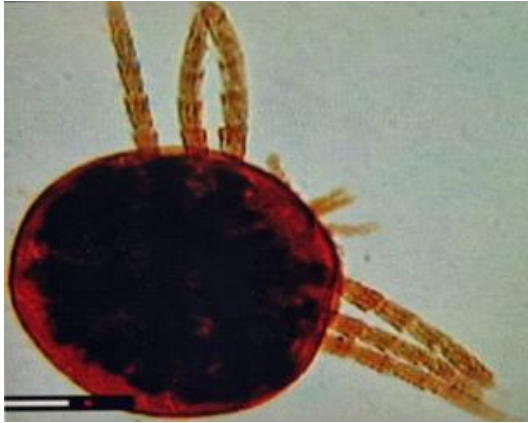


Figure 3. Specimen of *Argas persicus* larva collected from Domestic Pigeon



Figure 5. *Argas persicus* ticks in the raised and centrally pitted lesions in the Knee region exposing even bone of Domestic pigeon

birds were counted in the present study unlike previous studies in which ticks from the cracks and crevices of poultry pens and surroundings were also counted.

Early histopathologic lesions due to time of infestation included edema, hemorrhagic foci, vascular congestion, necrosis and mild to severe inflammatory reaction in dermis. In late lesions, presence of micro abscess foci in dermis was prominent. Our observations on



Figure 4. *Argas persicus* larvae in the raised and centrally pitted lesions in the neck region of Domestic pigeon

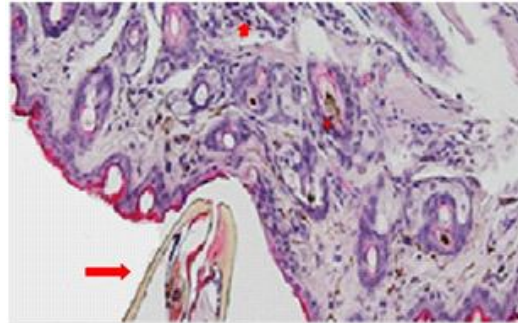


Figure 6. Photomicrograph showing histopathology of skin of domestic pigeon revealing transverse section of capitulum of *Argas persicus* (arrow) and accumulations of neutrophils and a few eosinophils, indicating an early focal inflammatory response (arrow heads).
Bar = 50 μ M.

pathology of the Argas tick on pigeons are completely in line with the observations of other authors on pigeons, poultry birds and other animals^{4,6,8}.

Conflict of interest: No conflict of interest involved.

Compliance with Ethical Standards: Study was approved by the Ethical Committees on Research of S.P. College, Cluster University Srinagar and Govt. Degree College Ganderbal.

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