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INCIDENCE OF PARASITES OF THE AFRICAN HEDGEHOG (*ATELERIX ALBIVENTRIS*: WAGNER, 1841) AND ITS ASSOCIATED PACKED CELL VOLUME CHANGES

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ABSTRACT

Studies on the incidence of parasites of the African hedgehog (Atelerix albiventris) and its associated packed cell volume (PCV) changes were conducted in Maiduguri, North-eastern Nigeria. A total of fifteen (15) Hedgehogs comprising of 7 males and 8 females were examined for ecto and endo-parasites and their PCV evaluated for any association with infection. An incidence of 4(26.7%) was obtained for endoparasites mainly of Capillaria ova, with 3(37.5%) for female and 1(14.3%) for male (p<0.05). Ticks were the only ectoparasites obtained with an incidence of 6(40.0%) comprising of male hedgehogs with 2(28.6%) and females with 4(50.0%) (p<0.05). Rhipicephalus species was the only tick identified. The mean ± SD PCV of hedgehogs indicated that of males as 31.36 ± 1.38 and females as 30.88 ± 3.09, however no significant difference (p>0.05) was obtained but both values were lower than the normal reference values.

Keywords: Incidence, Ticks, Capillaria, Parasites, Packed Cell Volume, Hedgehogs.

INTRODUCTION

The hedgehog is a mammal of the sub family *Erinaceinae* and the order *Erinaceomorpha*, characterized by short grooved spines covering the entire dorsum of the body. They live in a variety of habitats where they dig their own burrows, spend most of the day light hours asleep and emerge at night to forage (Hoefer, 1994). They have adapted to nocturnal and insectivorous way of life (Hutterer, 2005). Hedgehog's feeds primarily on invertebrates such as spiders and insects, occasionally also consuming small amounts of plant matter or small vertebrates (Nicholas, 1999 Wikipedia 2011). They are also opportunistic feeders with an extremely high tolerance to toxins (Nicholas, 1999; Wikipedia 2011).

The African hedgehog (*Atelerix albiventris*) is found across Africa, from Senegal across Ethiopia and south to the Zambezi River (Hutterer, 2005). It is found at elevations as high as 6,600 ft

(Wikipedia 2011) and prefers to shelter in desert biomes (Nicholas 1999). It is commonly found in the Northern states of Nigeria mostly in the savanna zone (Okorie-Kanu et al., 2015). Nevertheless, it is widely distributed throughout country.

Hedgehogs have been used by humans as food and pets. In Nigeria, Okaeme and Osakwe, (1998) reported that the African hedgehog *Atelerix albiventris* is widely eaten as bush meat. However, there has been reports on the diseases afflicting hedgehogs and the zoonotic or potentially zoonotic agents carried by them (Riley and Chomel, 2005), and their implication in the epizootiology of parasites of ruminants (Kaikabo et al., 2006).

Hedgehogs have been reported to be infected with different ectoparasites as well as endoparasites (Beck, 2007; Youssefi et al., 2011; Goz et al., 2016). Ticks are blood sucking arthropods, which are ecto-parasites of domestic and wild animals. Hedgehogs are infested with several species of ticks (Pfaffle, 2011). One of the species that infest

hedgehogs is *Rhipicephalus turanicus* (Youssefi et al., 2011; Goz et al., 2016). It is wide-spread from Africa to Asia and Europe. *Rhipicephalus turanicus* is a three-host tick. The adults generally are common during the late rainy to early dry seasons.

Furthermore, endoparasites have also been reported in the hedgehogs. The most common gastrointestinal helminth is *Capillaria erinacei* (Beck, 2007). Several reports on parasitic infections of hedgehog are available from other parts of the world. Data on this aspect is lacking in Nigeria and Maiduguri in particular and the effects of these parasites on the Packed Cell Volume (PCV). Thus, the current study was undertaken to report the occurrence of parasites of the Africa Hedgehog (*Atelex albiventris*) and its associated packed cell volume changes.

MATERIALS AND METHODS

Study Area

Borno State with Maiduguri as its capital lies between latitude 10.2°N and 13.4°N and longitude 9.8°E and 14.4°E with an area of 69,436 sq km located in the North eastern corner of Nigeria sharing borders with Niger to the North, Chad to the Northeast and Cameroun to the East (Musa and Pindar, 2005). The State has Sahel vegetation in the North and a Sudan Savanna in the South. The University of Maiduguri is located in the capital Maiduguri along Bama road.

Capturing of Hedgehogs

The hedgehogs were captured using spotlights and protective gloves between October and November, 2015, and 15 of them were obtained live from farms and roadsides at night within the University of Maiduguri., The Hedgehogs were then transported in well ventilated wooden boxes to the Veterinary Parasitology and Entomology Laboratory, University of Maiduguria for examination.

Examination of Hedgehogs for Ectoparasites

Each hedgehog was placed into a wide mouthed glass bottle containing cotton soaked with chloroform as anaesthesia. After 30 minutes, the hedgehogs were euthanized and their entire body parts combed for collection of ectoparasites, and their identification done using standard parasitological keys as described by Souls by (1982).

Examination of Hedgehogs for Endoparasites

The euthanized hedgehogs were each directed using a scalpel blade, and the entire gastrointestinal tract removed and also dissected for collection of adult worms. In addition, faecal scrapings were obtained for examination of helminth ova using the methods of floatation and light microscopy as described by Soulsby, (1982).

Determination of Packed Cell Volume (PCV)

From each dissected hedgehog, a sterile surgical knife was used to dissect the heart, and blood was scooped into an ethylene diaminetetracetic acid (EDTA) bottle and the PCV evaluated using the microhaematocrit method as described by Bush, (1975).

Statistical Analysis

Data was analysed using simple percentages. Association between parasitism and sex was determined using chi square analysis. PCV values were summarized as Mean \pm SD.

RESULTS

The results of this study indicated an overall incidence of 4(26.7%) for *Capillaria sp.* ova with 3(37.5%) for females and 1(14.3%) for male. No significant difference($p=0.6027$) was observed between sex and the incidence of *Capillaria sp* ova (table 1).

Also, the tick *Rhipicephalus species* was the only ectoparasite identified with an overall incidence of 6(40.0%), with male hedgehogs having 2(28.6%) and female with 4(50.0%). No significant difference was observed between sex ($p= 0.6594$) (Table 1). The PCV was 31.36 ± 1.38 for male and 30.88 ± 3.09 for female ($p<0.05$) (Table 2).

Table 1: Incidence of Parasites of Hedgehogs Examined in Maiduguri, Nigeria

Sex of Hedgehogs	No. Examined	No. (%) infected	
		<i>Capillaria sp. Ova</i>	<i>Rhipicephalus sp</i>
Male	7	1(14.3) ^a	2(28.6) ^a
Female	8	3(37.5) ^a	4(50.0) ^a
Total	15	4(26.7)	6(40.0)

No significant difference was observed ($p>0.05$)

Table 2: Packed Cell Volume of Hedgehogs based on their Sex

S/No	PCV (%) of Hedgehogs	
	Male (n=7)	Female (n=8)
1.	30	35
2.	30	28
3.	31	35
4.	33	29
5.	30	32
6.	32	27
7.	33	32
8.	-	29
Mean \pm SD	31.36 \pm 1.38	30.88 \pm 3.09
Normal reference range	33.50–44.50	35.00–47.00

NB: Normal reference range by Okorie-Kanu *et al.*, 2015

DISCUSSION

This study has observed an incidence of 26.7% and 40.0% for *Capillaria* and *Rhipicephalus* species respectively. These parasites have been reported in a similar study by Kaikabo *et al.*, (2006) who recorded a prevalence of 31.5% for *Capillaria erinacei* in West African nocturnal hedgehog (*Ateletrix albiventris*) and Osukwe, (1985) who reported the tick *Rhipicephalu sanguineus* among others in the same hedgehog species.

The zoonotic potentials of the African hedgehogs in carrying several pathogens has been reported by several researchers (Kaikabo *et al.*, 2006; Osukwe, 1985 and Riley and Chomel, 2005). The risks of contacting these pathogens are particularly of concern for humans in contact with wild caught hedgehogs and adopting them as pets or those hunting them for use as bush meat.

Other potential zoonotic pathogens carried by hedgehogs though not reported in this study

includes Q-fever by *Coxiella burnetti*, encephalitis virus, Crimean-Congo haemorrhagic fever, Tahyna virus and Bhanja virus all transmitted by ticks (Riley and Chomel, 2005). Furthermore, Kaikabo *et al.*, (2006) also reported that the hedgehog has been implicated in the epizootiology of helminth parasites of ruminants.

The PCV of 31.36 \pm 1.38 was reported for males and 30.88 \pm 3.09 for females. However, these values appeared to be lower than the referenced normal value of 36.0-38.5% by Okorie-Kanu *et al.*, (2015), signalling a form of blood loss anaemia. Furthermore, it has been reported by Mejri *et al.* (2002) that the immunosuppressive effects of ticks not only support the transmission of pathogens but facilitates infection by endoparasites such as *Capillaria* species and other secondary infections (Beldomenico *et al.*, 2008).

CONCLUSION

In conclusion, the presence of ticks as well as helminth parasite of zoonotic importance in the African hedgehogs therefore underscores its importance as a likely host for the transmission of zoonotic pathogens. Thus, further researches are required due to considerable unexplored area of our country in order to increase our knowledge

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