

Traumatized Reptiles: A Retrospective Study of Wild Reptiles Examined in Northeastern Brazil

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Abstract

Physical injuries represent one of the main threats to free-living animals, and interactions with humans perform the leading cause of their admission in veterinary care. In the USA, the main causes of physical injuries in reptiles and amphibians were run over, fishing or gardening accidents, and predation by domestic carnivores. Anthropogenic actions potentially increase the morbidity and mortality in reptiles due to traumatic injuries and can cause populations to be isolated in forest remnants, such as urban parks. Fortaleza is a metropolis in northeastern Brazil, that has progressively lost its vegetation cover due to urbanization processes. However, as the ERA "Matinha do Pici", few urban parks stand out as a hotspot of local fauna conservation. The objective of this work was to report and characterize a sample of traumatized reptiles, received, and examined at LAPS-UFC, in Fortaleza, from 2010 to 2020. Thirty-four cases were included, mostly lizards from the ERA "Matinha do Pici", with diverse blunt force lesions, mainly caused by domestic carnivores' predation, run over or human predation.

Keywords: Wildlife; Physical Injuries; Predation; Roadkill; Ceará

Abbreviations

ERA: Ecological Relevance Area; LAPS: Academic Wildlife Pathology Laboratory.

Introduction

Physical injuries represent one of the main threats to free-living animals, grouped into three categories: conflicts with other animals, accidents and natural disasters [1]. Interactions with humans perform the leading cause of their admission in veterinary care, and rehabilitation attempts have been recorded in common and widely distributed species [2-4].

A study in the USA showed the main causes of physical injuries in reptiles and amphibians were run over, fishing or gardening ac-

cidents, and predation by domestic carnivores [5,6]. Rehabilitation centres recorded therapeutic success and subsequent releasing in 68 to 84% [5]. However, monitoring and rehabilitation centres are not always available, which predisposes to increase morbidity and mortality of traumatized animals. The taxa involved are varied and depend on the local fauna and the risks of existing trauma [7].

Although urban regions can be attractive to some species of reptiles, most studies indicate adverse effects of these regions on their survival rates [7]. Urbanization produces habitat fragmentation, reduces diversity, and may cause the isolation of reptile populations in forest remnants [8,9], as urban parks. Consequently, these events represent potential risks of traumatic injuries by anthropogenic actions [6].

With more than nine million inhabitants, Ceará is the fourth largest state in the Northeast region of Brazil. Fortaleza is its principal city, considered the most urbanized capital of the northeast region; it is located on the state’s northern coast, with an area of 360 km² and 2.5 million inhabitants [10]. In 1988, the vegetation cover of Fortaleza was 154 km², composed of a coastal vegetation complex, Atlantic Forest and caatinga. In thirty years, this coverage lost 21% in area, as population density increased [11]. The ERA “Matinha do Pici” [12] stands out among the conservation units, housing 44 species of native reptiles and amphibians [13]. Thus, forest fragments, transformed into urban parks and conservation units, are essential for preserving local herpetofauna, which still resists the advance of local urbanization [14].

The objective of this work was to report traumatized reptiles, received and examined at the Academic Laboratory of Wild Pathology (LAPS-UFC), in Fortaleza, from 2010 to 2020, characterizing types of traumas and the main species affected.

Materials and Methods

A retrospective study was conducted in the evaluation records of live or dead animals from 2010 to 2020. The cases were tabulated according to the year of occurrence, taxon/species, origin, type of examination, classification (according to Ressel and Tremori [15,16] and causes of injuries. The results were presented as absolute and relative frequencies of occurrence.

Results and Discussion

Thirty-four cases of injured reptiles were counted, representing 28% of the total necropsies in the period. The distribution of causes by the taxonomic group is presented in table 1.

Causes of injury	Taxon			
	Lacertilia	Serpentes	Chelonia	Total
Predation by carnivores	11	4	1	16
Roadkill	6	3	no	9
Predation by humans	4	2	no	6
Gardening accidents	1	1	no	2
Electrocussion	1	no	no	1
Total	23	10	1	34

*no = not observed.

Table 1: Causes of injury in reptiles examined between 2010 and 2020 at LAPS-UFC diagnostic service, Brazil.

The cases were diagnosed by external examination (55.8%), necropsy (38.2%) and clinical diagnosis (5.8%).

Most of the reptiles examined (70.5%) proceeded from the UFC Pici Campus or adjacent regions. The Pici Campus (Figure 1) contains the buildings and academic structure of the Federal University of Ceará, around the conservation unit ERA “Matinha do Pici”, in the western Fortaleza [17]. It is characterized as a remnant forest fragment and acts as a relevant wildlife refuge within the metropolis of Fortaleza.

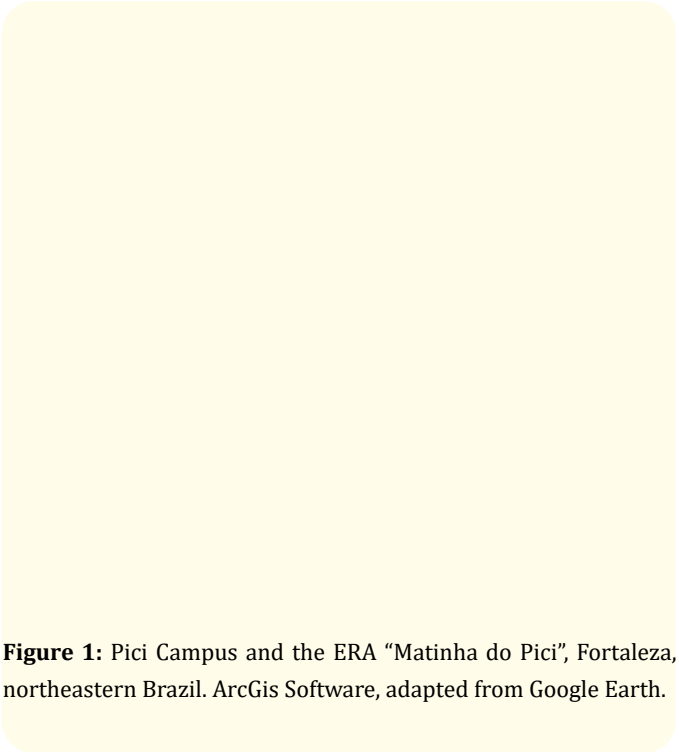


Figure 1: Pici Campus and the ERA “Matinha do Pici”, Fortaleza, northeastern Brazil. ArcGis Software, adapted from Google Earth.

In this context, reptiles and other animals constantly conflict with direct and indirect anthropic urban actions. Although management and conservation plans have not been developed to date, factors such as paved roads, abandonment of domestic animals, and humans’ regular presence are characterized as potential threats to that fauna [18,19]. Even most users are higher education students, which may interact respectfully with herpetofauna [20], irrational fear and revulsion by reptiles frequently make them victims of aggression [21]. In addition, peripheral surrounding communities with a low human development index can integrate another factor of conflicts between wildlife and humans [22].

The sample consisted predominantly of lizards (67.6%), with blunt force lesions due to predation by domestic carnivores (68.7%). The most affected species were *Iguana iguana* (20.6%) from the Pici Campus and *Hemidactylus mabouia* (20.6%) from peridomiliary urban areas. Snakes predated by carnivores (25%) had puncture marks compatible with domestic cats' bites, according to the morphometry already described [23]. Researchers [24] estimated that about 478 million reptiles are potentially predisposed to predation by domestic cats in the U.S. annually. The main species and the frequency of their lesions are listed in table 2. Traumatic injuries are described in figure 2.

Taxon/Species	RF
Lacertilia	67.6%
<i>Hemidactylus mabouia</i>	20.6%
<i>Iguana iguana</i>	20.6%
<i>Tropidurus hispidus</i>	17.6%
<i>Salvator merianae</i>	8.8%
Serpentes	29.4%
<i>Philodryas olfersii</i>	11.8%
<i>Philodryas nattereri</i>	5.9%
<i>Boa constrictor</i>	5.9%
<i>Helicops leopardinus</i>	2.9%
<i>Oxyrhopus trigeminus</i>	2.9%
Chelonia	2.9%
<i>Kinosternon scorpioides</i>	2.9%
Total	100.0%

Table 2: Relative frequency (RF) of injured species recorded by LAPS-UFC between 2010 and 2020.

A recently rescued freshwater turtle from the Pici Campus, kept in captivity for few weeks, was the only examined chelonian. It showed the caudal shell edge and extremities of the limbs with gnawed digits and scar tissue, noting predatory chewing by competition with other turtles in the tank. Territorialism and competition between males result in serious aggressions and can be prevented with fewer individuals inside the enclosures or separated during reproductive seasons [25].

Roadkill was the second leading cause of injury (27.2%), followed by predation by humans (21.2%). It was observed that the trauma prevalence in reptiles and amphibians increased during the spring and summer months in the central U.S., which corresponded to periods of greater dispersion and confrontations of these animals with humans [5]. As ectothermic organisms, the search for adequate heat sources leads them to lie on the paved roads for thermoregulation [26]. Consequently, this behaviour makes these ectothermic animals vulnerable to trauma from roadkill and crushing caused by motor vehicles and pedestrian traffic [26,27]. The impact of motor traffic is strong enough to limit the growth of some chelonians' populations, as they cannot avoid traffic, and their low fertility does not allow equivalent replacement of dead individuals [28].

Figure 2: Traumatic injuries in reptiles examined in LAPS-UFC from 2010 to 2020. Road-killed lizards. a) *Iguana iguana*, alive with fractured tail, and b) *Salvator merianae*, dead with fractured tail and cloacal prolapse. Blunt force trauma. c) *Philodryas nattereri*, dead with vertebral fracture and lacerated tissues; d) *Iguana iguana*, alive with a gangrened laceration in the left anterior limb, and e) *Boa constrictor*, recently euthanized with extensive laceration by electric grass trimmer. Puncture wounds. f) *Oxyrhopus trigeminus*, dead with multifocal pairs of puncture wounds in dorsal (not seen) and ventral (black arrowheads) regions.

Extensive lacerations are severe injuries due to roadkill, combining bruises and tissue rupture [6]. Predation by humans is reported as a conflict of interaction between men and wild animals. Regarding reptiles, snakes are usually the most affected group due to the perceived risk they offer, while many lizards and amphibians cause revulsion and fear [29]. Blunt force action defines the road-kill inflicted injuries, such as blows and shocks with unsharp instruments [15], in addition to injuries due to hunting, defence or collecting by cultural appeal [30].

One case was diagnosed as “electrocution”. In an area of vegetation suppression adjacent to Pici Campus, the event was witnessed by several people, including technicians who tried to contain the Iguana before it reached the machinery electric cables. Injuries included tongue bite laceration, thoracic haemorrhages, joint stiffness, and distended heart, with clots. There was one left rib fractured, causing lung perforation, and it was not clear whether due to a manual contention attempt or strong muscle contractions. Congestion was seen in the liver, spleen, lungs and heart. The carcass showed early *rigor mortis*. Internal lesions associated with electrical injury are usually very subtle unless due to high voltage and prolonged contact. Early *rigor mortis* was suggestive of high voltage electrical shock [31]. Maybe if nobody had seen the event, the diagnosis could be challenging to determine causes with necropsy only.

Conclusion

Reptile traumatic injuries accounted for nearly thirty per cent of the LAPS-UFC cases between 2010 and 2020. Lizards were the most affected by roadkill and predation, mainly by domestic cats. The information in this article will contribute to the statistics of damage to urban fauna in general. It will serve locally as subsidies for developing risk mitigation strategies, especially in the ERA “Matinha do Pici”.

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Conflict of Interest

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