



Case Report/Relato de Caso

Piranha attacks in dammed streams used for human recreation in the State of São Paulo, Brazil

Ataques de piranhas em riachos represados usados para atividades de lazer, no Estado de São Paulo

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ABSTRACT

In recent years, attacks by piranhas have become a common problem in dammed portions of rivers and streams in the State of São Paulo, Southeastern Brazil. In two outbreaks recorded in two neighboring counties in the Northwest region of the state, 74 bathers were bitten. Only one bite per person was recorded during a short period of the year. The bites were related to parental care and/or defense of spawning territory, which confirms previous studies and demystify the attacks by these legendary fish, as they are perceived by most people. Placement of fine mesh nets and removal of aquatic vegetation stopped the attacks.

Key-words: Piranha attacks. Bites. *Serrasalmus*. Damming. Brazil.

RESUMO

Ataques por piranhas vêm se tornando um problema comum em trechos represados de rios e córregos no estado de São Paulo, Sudeste do Brasil. Em dois surtos ocorridos em dois municípios vizinhos no noroeste do estado, 74 banhistas foram mordidos. Uma mordida por pessoa foi registrada, em curto período do ano. As mordidas estão relacionadas a cuidado parental e/ou defesa do território de desova, o que reforça estudos anteriores e desmistifica os ataques por este peixe lendário, da maneira como são popularmente percebidos. A colocação de redes de malha fina e a remoção de vegetação aquática cessaram os ataques.

Palavras-chaves: Ataques por piranhas. Mordidas. *Serrasalmus*. Represamentos. Brasil.

INTRODUCTION

Piranhas are carnivorous characid fishes that may attack humans, although these attacks are mostly single bites on toes, fingers or heels^{1,2}. This behavior is not a feeding one as sometimes claimed (see² for an alternative view), rather is related to parental care and/or defense of spawning sites¹. In Southeastern Brazil, these attacks are reported during short periods of the year, usually late austral summer and early autumn¹.

The piranha species associated with human attacks in State of São Paulo, Southeastern Brazil is the speckled or dark-banded piranha (*Serrasalmus maculatus*, formerly *Serrasalmus spilopleura*),

a diurnal predatory fish that lives solitarily or in small groups of up to 20 individuals in calm portions of rivers and streams or ponds³. Larvae and juveniles shelter and feed within the root tangle of water hyacinths⁴ and juveniles and adults feed mostly on fins and muscle portions of fishes^{3,5}.

Bites by speckled piranhas occur mainly on the toes, heels and fingers of bathers and swimmers¹ or hands of fishermen, when handling hooked or netted fish. The wound is craterlike and bleed profusely due to laceration and tearing of tissues and damage to medium to large blood vessels^{1,6}. The piranha bite problem is most probably related to environmental changes, as river damming offers favorable conditions for breeding and population establishment of this piranha species^{1,3,7}. Additionally, an increase in the use of these habitats as recreational areas has occurred in several regions; thus the combination of these factors is creating interfaces that did not occur previously¹. This interface is responsible for the piranha bites and is mistakenly linked to feeding attacks by schooling piranhas or feeding behavior by single individuals. In some areas, misinformation regarding piranha attacks can create panic, but the problem is restricted to one or two weeks a year and controllable by preventive measures.

In October and December 2009, two outbreaks of piranha bites in the Northwest area of the State of São Paulo, appeared in newspapers and were broadcasted by local and national television networks. Such broad coverage was due to the fact that the injuries were caused by one of the most feared fishes, the attacks being linked to folklore and myths about piranhas, most of them unsubstantiated^{1,6}. Similar episodes of piranha bites are reported for some small towns in the State of São Paulo, including Itapuí, Iacanga and Santa Cruz da Conceição¹, through which the River Tietê and/or its tributaries flow. The aim of this paper was to report on two outbreaks of piranha bites in two towns in the State of São Paulo, Southeastern Brazil, and comment on the increasing incidence of this kind of problem in dammed rivers and streams of the Tietê River basin.

CASE REPORT

The towns of Ubarana and Adolfo lie at the confluence of the Jacaré and Fartura streams, two tributaries of the River Tietê divided by a dammed river stretch (21°09'56"S, 49°43'03"W), have manmade beaches used by bathers and up to 5,000 visitors may use these beaches on weekends during the warm periods of the year (**Figure 1**). In both towns, local people and beach vendors stated that piranha bites, to a greater or lesser extent, occur almost every year at these beaches during the above mentioned periods (**Figure 2**).

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FIGURE 1 - Below: fine mesh nets placed to prevent piranha attacks at the Adolfo beach, State of Sao Paulo, Southeastern Brazil.



FIGURE 2 - Outdoor warning of piranha attacks at the Adolfo beach. Note fishermen in the background and abundant aquatic vegetation (the vegetation was later removed).

Data on bitten individuals were obtained at the Emergency Center (in Adolfo) and first aid stations erected on the beaches to care for the piranha bite victims (in Adolfo and Ubarana), where patients were given intensive local washing of the wound, tetanus immunization and compressive dressings to control bleeding, according to procedures recommended in similar situations¹. Sixteen patients were examined by the first author and the characteristics of the bites were recorded (Figure 3). These bites were the same as those described by health professionals who treated the wounds.

The piranha attacks initially took place on a beach of the town of Adolfo. In a period of three days (16 to 18 October 2009), 23 bathers and/or swimmers were bitten by piranhas while in shallow water. Bites were equally distributed among men and women (approximately 30% were children) and all patients suffered only one bite. Twenty one bites were on the feet (91.3% of the total), the hallux being the most affected lesion site with 12 (52.2%) bites. The remaining bites on the feet occurred on the other toes (7 bites or 30.4%) and the heel (4 bites or 17.4%); two bites occurred on the ankle (8.7%). The bleeding was important in all cases, but compressive bandages controlled the problem. The first author visited the site and, after a discussion with the local health authorities, fine mesh nets were



FIGURE 3 - An adult individual of *Serrasalmus maculatus*, the speckled piranha (note triangular, razor-sharp teeth). Right: two crater-like bites, one on the fifth toe and the other on the hallux. The authors are thankful to TV TEM, a local network, for the last image.

placed at the perimeter of the beach, located about four meters from the beach, and all the aquatic plants that surrounded the site were removed through the action of local fishermen and their boats, by a manual process. No more accidents occurred after these simple, preventive measures.

On the opposite side of the same river stretch, the beach of the town of Ubarana also had an outbreak of piranha bites, about two months after the one reported above. A larger number of bathers (51) were bitten, with a peak of accidents on 19 and 20 December 2009. The profile was similar to that observed in Adolfo, with a slight difference in the number of child victims (20% versus 30%). Forty five bites (about 88% of the total) were on the feet and the hallux was again the most (70.4%) affected site. Four (7.8%) bites were on the ankles and two (3.9%) were on fingers of children. Under the advice of the first author, the same measures adopted on the beach at Adolfo were repeated at Ubarana and no further injuries were recorded.

DISCUSSION

The attacks followed the profile already described for other regions of the State of São Paulo where the problem occurred in dammed rivers¹. Piranha bites were mostly on the feet and heels, with a few lesions elsewhere. This is consistent with patients bathing and/or wading in shallow water, with their feet first approaching a nest with eggs or a spawning territory protected by the piranhas¹. Since the patients were bitten only once, attacks by piranha schools can be immediately ruled out. One bite per person characterizes a warning by the piranhas towards a potential predator or danger to their spawn or spawning sites¹. The lesions, although deep and presenting profuse bleeding were easily controlled by compressive bandages and were considered of mild severity, although more severe lesions may occasionally occur, such as the amputation of toes¹.

An important point is that the piranha attacks appear seasonal and are related to the main spawning season of these fish (October to December)^{1,7}. The period of the attacks is brief, with a peak after a day or two and always coincides with a large number of people on beaches and intense activity in the water. The outbreaks are followed by a period with no accidents for one or two years afterwards. Feeding

attacks, such as those piranhas use to obtain fin and muscle pieces of other fish⁶ occur throughout the year at these and similar places. Thus, piranha attacks on people during the bite outbreaks clearly are not of a feeding nature.

Of interest is the fact that the first outbreak began on one side of the stream in the town of Adolfo, where 23 accidents were reported over three days. The prompt action of the health office, placing fine mesh nets and removing the aquatic vegetation near the beach, had the decisive effect of stopping the outbreak. No more recorded bites occurred after these measures were taken, even when a large number of bathers used the now protected beach. However, a greater number of casualties was recorded two months later in a very similar area with calm waters, but with no nets and with abundant aquatic vegetation (Ubarana). This suggests that part of the adult piranha population that had no access to the beach area of Adolfo moved across the stream searching for calm waters and aquatic vegetation, reinitiating the problem on the beach in Ubarana on the opposite side of the river.

As reported previously¹, the problem of piranha attacks shows a tendency to increase, since the construction of dams is growing in Southeastern Brazil, thus causing an increased number of injuries in various places in the State of São Paulo. The present report strengthens our previous statement.

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