Dog bite injuries in children – a review of data from a South African paediatric trauma unit

J P Dwyer, T S Douglas, A B van As

Background and objective. Dog bites are a major cause of preventable traumatic injury in the paediatric population. We aimed to determine the epidemiology of dog bite injuries in a group of South African children with a view to developing potential preventive strategies.

Design, setting, subjects. A retrospective review was done of patients presenting with dog bite injuries to the trauma unit at the Red Cross War Memorial Children’s Hospital in Cape Town over a 13.5-year period.

Results. We identified 1 871 children treated for 2 021 dog bite injuries during the study period. Dog bites accounted for 1.5% of all trauma unit presentations. Male children accounted for 68% of the patients. Children under 6 years of age were more likely to have sustained injuries to the head, face or neck, while children older than 6 years more commonly received injuries to the perineum, buttocks, legs or feet. Younger children were more likely to be attacked at home and older children outside the home. The most frequent injuries were superficial, and the majority of patients were treated with simple medication, dressing or suturing. There were no dog bite-related fatalities.

Conclusion. The relationship between the geographical location of dog attacks on children and the age groups attacked suggests that strategies to prevent dog bites should target both parents supervising younger children at home, and older children who encounter dogs outside the home.


Corresponding author: T S Douglas (tania.douglas@uct.ac.za)
and January. Seven hundred and forty-three patients (40%) presented to hospital between 12h00 and 18h00, and 891 children (48%) presented between 18h00 and 0h00. A large proportion of all attacks occurred either inside or outside the victim’s own home and at the home of friends or family (Table I). Children younger than 6 years old were more likely than older children to be attacked inside their own home ($p = 0.0001$). Children 6 years old and older were more likely than younger children to be attacked on a road or pavement ($p = 0.0000$) or in a public place ($p = 0.011$). No other associations were found between age and geographical place of attack.

The breed of dog involved in the attack was recorded for only 25 children (1%). The most common breeds were pit bull terriers ($N = 7$) and German shepherd ($N = 6$). In 10 cases more than one dog was noted to have been involved in the attack, and in a further 4 cases either known rabies or rabid behaviour was reported in the dog.

A total of 2 021 dog bite injuries were sustained by the 1 871 children. Overall, the most commonly injured anatomical locations were the leg or foot and the head, face or neck (Table II). Children younger than 6 years of age were more likely than older children to sustain injuries to the head, face or neck ($p = 0.0000$). Children 6 years or older were more likely than younger children to sustain injuries to the perineum or buttock ($p = 0.0003$) and to the leg or foot ($p = 0.0000$). No association was found between age group and frequency of injuries to the trunk, shoulder, arm or hand.

The majority of injuries ($N = 1 718, 85\%$) were minor, including superficial lacerations, abrasions and closed tissue injuries (Table III). Significant injuries ($N = 303, 15\%$) included complicated lacerations, joint injuries and fractures, concussions, neurovascular injuries and amputations. Most patients were treated with simple medication, dressing or suturing (Table III). Two patients presented to the trauma unit in a state of shock and required complex resuscitation, and 92 children (5%) required a general anaesthetic. One hundred and fifty-one patients (8%) were admitted to the trauma ward or directly to another ward, including the intensive care unit, as a result of the attack. There were no dog bite-related fatalities.

Limitations
Several limitations must be considered in relation to this study. Because less than 50% of dog bites are reported to doctors, our data may not be representative of all children sustaining dog bite injuries in our population. One and a half per cent of

---

**Table I. Geographical place of occurrence of dog bite injuries in children aged less than 6 years and 6 years or older (N (%))**

<table>
<thead>
<tr>
<th>Place of occurrence</th>
<th>&lt; 6 years</th>
<th>≥ 6 years</th>
<th>Unknown age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own home inside</td>
<td>114 (14)</td>
<td>91 (9)</td>
<td>2 (22)</td>
<td>207 (11)</td>
</tr>
<tr>
<td>Own home outside</td>
<td>303 (38)</td>
<td>365 (34)</td>
<td>3 (33)</td>
<td>671 (36)</td>
</tr>
<tr>
<td>Other home inside</td>
<td>45 (6)</td>
<td>49 (5)</td>
<td>1 (11)</td>
<td>95 (5)</td>
</tr>
<tr>
<td>Other home outside</td>
<td>152 (19)</td>
<td>215 (20)</td>
<td>1 (11)</td>
<td>368 (20)</td>
</tr>
<tr>
<td>Road or pavement</td>
<td>123 (15)</td>
<td>247 (23)</td>
<td>2 (22)</td>
<td>372 (20)</td>
</tr>
<tr>
<td>Public place</td>
<td>16 (2)</td>
<td>44 (4)</td>
<td>0 (0)</td>
<td>60 (3)</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>44 (6)</td>
<td>54 (5)</td>
<td>0 (0)</td>
<td>98 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>797</td>
<td>1 065</td>
<td>9</td>
<td>1 871</td>
</tr>
</tbody>
</table>

---

**Table II. Anatomical sites of dog bite injuries in children aged less than 6 years and 6 years or older (N (%))**

<table>
<thead>
<tr>
<th>Anatomical site</th>
<th>&lt; 6 years</th>
<th>≥ 6 years</th>
<th>Unknown age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, face or neck</td>
<td>421 (50)</td>
<td>211 (18)</td>
<td>1 (11)</td>
<td>633 (31)</td>
</tr>
<tr>
<td>Trunk</td>
<td>65 (8)</td>
<td>66 (6)</td>
<td>1 (11)</td>
<td>132 (7)</td>
</tr>
<tr>
<td>Shoulder, arm or hand</td>
<td>141 (17)</td>
<td>205 (17)</td>
<td>0 (0)</td>
<td>344 (17)</td>
</tr>
<tr>
<td>Perineum or buttock</td>
<td>36 (4)</td>
<td>96 (8)</td>
<td>1 (11)</td>
<td>133 (7)</td>
</tr>
<tr>
<td>Leg or foot</td>
<td>187 (22)</td>
<td>586 (50)</td>
<td>6 (67)</td>
<td>779 (39)</td>
</tr>
<tr>
<td>Total*</td>
<td>850</td>
<td>1 162</td>
<td>9</td>
<td>2 021</td>
</tr>
</tbody>
</table>

*Some patients presented with more than one injury.
trauma unit presentations in our study population were as a result of dog bites, while Schalamon et al. and Kahn et al. reported that dog bites accounted for 0.31% and 0.24% of paediatric trauma-related hospital visits, respectively. The comparatively large proportion of visits to the trauma unit attributable to dog bites in our study population may be related to referral patterns in our primary health care system, or to patterns of child and dog supervision and behaviour in the study population.

Some of our data are incomplete with regard to exact circumstances of the dog bite – the breed of the dog and whether the dog was provoked before biting were not recorded in all cases. Previous studies have addressed these issues. Finally, delays between time of injury and time of seeking treatment may have affected the validity of using time of presentation as a surrogate marker for time of injury.

Discussion

Children are at greater risk of being bitten by a dog than any other age group, and the problem occurs worldwide. In this study, 68% of children bitten were boys, and the peak incidence of dog bites was at age 4-7 years. These demographic data are consistent with other reports of dog bites in children presenting to paediatric emergency and trauma units, and may reflect the natural behaviour of young boys, including yelling and grabbing, which puts them at risk for dog bite injuries. Our results suggest that dog bites are more likely to occur in the afternoon and evening during summer vacation months when children are more likely to be playing outside. Our results also support previous findings that dog bites more often occur at the family home or at the homes of friends or relatives, therefore involving the family pet or one familiar to the child. This highlights the fact that a known dog cannot necessarily be regarded as a safe dog. The higher likelihood of younger (rather than older) children being bitten inside their own home and of older (rather than younger) children being bitten while on a road or on the pavement, reflects the level of mobility of these age groups.

While we cannot draw conclusions from our limited data on dog breeds, the higher number of children attacked by pit bull terriers and German shepherds is consistent with the literature – pit bull-type dogs have been shown to be involved in a high proportion of fatal human attacks, while German shepherds and Dobermans accounted for a large proportion of dog bites in children in a recent study. No information is available regarding numbers of the individual breeds in our patient drainage area. Caution must be exercised when interpreting dog breed data because of unreliability of identification and uncertainty of breed assignment by owners.

Ten children were the victims of a multiple dog attack. All dogs are social animals that have an innate pack instinct. Dogs acting in packs are known to be far more dangerous than the same animals as individuals; in the case of domestic dogs, the pack is most often the human family unit. A social hierarchy within the pack allows members to assume their place and to function accordingly. Any change to this hierarchy is potentially dangerous, for instance the family dog may challenge a new member of the pack (e.g. a new baby).

Our results suggest that bites to the head, face and neck in younger children (<6 years) and to the lower limbs in older children (≥6 years) are the most common age-specific anatomical locations for dog bite injuries. This is in agreement with other reports in the literature. Because of their short stature, injuries to young children are often to the head, neck and face and may be life threatening. Scarring is a common consequence of dog bites, and severe emotional stress may be associated particularly with wounds to the face.

Of the 2,021 injuries sustained by our patient group, most were classified as minor injuries such as superficial lacerations and abrasions. Most minor injuries were treated with simple medication, dressing or suturing. Management of dog bite wounds, including appropriate tetanus and rabies prophylaxis, has been reviewed previously. This study did not look at the significant psychological impact of dog bite injuries in children.

The public health implications of dog attacks are significant and there needs to be increased awareness of the risks to young children. Guidelines on dog bite prevention are largely unevaluated and there are very few interventional studies aimed at reducing the incidence of dog bites. Studies of dog behaviour suggest that risk factors for dog bite attacks include the dog’s genetic predisposition towards aggressiveness, its level of training, maltreatment, hunger and territorial instinct; and the behaviour, age and size of the victim. It has been suggested that scientists should do research on the relationship between animals and humans to identify ways in which to reduce the risk of bites. Dog behaviour experts recommend behaviour modification techniques to treat aggressive dogs. Studies have shown that certain breeds of dogs and male dogs of unneutered status are more likely to bite. A recent randomised trial conducted among school children has shown
that education programmes can alter behaviour towards dogs in the short term. Our findings on the geographical place of dog attacks suggest that interventions should be designed both for parents supervising younger children at home and for older children who encounter dogs outside the home.

In summary, our results support the findings of previous studies, viz. that the typical child injured by a dog is a boy, aged between 4 and 7 years, bitten at home or at the home of a friend or relative, in the afternoon or evening, and during summer.

This largely preventable cause of childhood trauma is multifactorial. Preventive strategies should be multidisciplinary in approach and aim to modify behavioural patterns of the pet owner, child and dog. Dog bite prevention information based on responsible dog ownership, parental supervision of children around dogs and appropriate behaviour around dogs should be provided.

The generous technical assistance of Ms Nelmarie Du Toit is gratefully acknowledged.

References


3. Kahn A, Robert E, Piette D, De Keuster T, Lamoureux J, Leveque A. Prevalence of dog bites on responsible dog ownership, parental supervision of children around dogs and appropriate behaviour around dogs should be provided.


16. Kneafsey B, Condon KC. Severe dog-bite injuries, introducing the concept of pack attack - a literature-review and 7 case-reports.


Accepted 15 January 2007.