

ORIGINAL RESEARCH ARTICLE

“A PROSPECTIVE STUDY ON PSYCHOLOGICAL IMPACT IN CHILDREN AFTER DOG BITE INJURIES IN BENGALURU URBAN”

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ABSTRACT

Introduction: Dogs are important members of many families in many countries. However, posttraumatic stress disorder (PTSD) in children after animal attacks has always been underestimated, and a more detailed study of PTSD in children after animal attacks is needed.

Methods: 57 children after animal induced injuries were reviewed. Family Apgar Scale assessment and PTSD screening were performed. On week after the visit to anti-rabies clinic, the patient underwent evaluation for acute stress disorder (ASD) diagnosis, by using the Child Acute Stress Questionnaire. PTSD screening and interim history-taking were performed 3 months after the emergency department admission, by telephone or in face-to-face interviews, by using the Clinician-Administered PTSD Scale for Children and Adolescents. P values of < .05 were considered significant.

Results: A total of 3 (5.26%) patients developed PTSD, including 2 patients with severe injuries and 1 patient with moderate injuries ($\chi^2 = 48.104$; $P < 0.000$). No significant differences in PTSD occurrence according to gender and age were observed. Family Apgar Scale scores were not significantly related to PTSD ($P = 0.781$). ASD and PTSD symptom severity scores were significantly associated ($r = 0.51$; $P = 0.005$).

Conclusions: Child victims of severe animal attacks should be considered at risk for the development of PTSD, family support was not correlated with posttraumatic stress symptoms in school-aged children after animal attacks, and ASD seems to be an early predictive indicator of PTSD.

Key words: Dog bite, Acute stress disorder, Post-traumatic stress disorder

INTRODUCTION

Dogs are important members of many families in many countries. Although the majority of dogs live peacefully with their adoptive families, a significant number of people are bitten by dogs every year. In India, about 15 million people are bitten by animals and need post exposure prophylaxis. Most bites are by dogs (91.5%), 60% are strays and 40% pets. Children, because they tend to underestimate the danger arising from dogs, are exposed frequently to bite accidents. A US study found that 46% of school children had been bitten by a dog by the time they reached grade 12.¹ Children who go through this traumatic event may have temporary difficulty adjusting and coping. With time and good self-care usually, they get better. Some children may experience Acute stress disorder (ASD) and post-traumatic stress disorder (PTSD). The aesthetic and psychological consequences of bite accidents may influence negatively the quality of life of children and their families.^{2,3}

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Posttraumatic stress disorder (PTSD) describes the clustering of symptoms that develop after exposure to traumatic events. Substantial evidence shows that exposure to traumatic experiences may affect brain function in several ways and may have long lasting consequences. ⁴ Rates of PTSD and PTSD symptoms may vary according to traumatic exposure. 60% of children exposed to a sniper attack met PTSD criteria 1 year after the incident⁵ and studies of urban youths exposed to community violence reported PTSD rates of 24% to 34.5%. ⁶ For most animal-induced injuries, children seem to be unharmed or only transiently affected. However, severe dog bites/scratches and multiple injuries may bring tremendous harm to children, both physically and psychologically. PTSD in children after animal induced injury is common but is a neglected condition for clinical paediatricians and Anti Rabies Clinic Physicians. Pediatric patients with PTSD are at risk for social, learning, and developmental disorders. ⁷ Therefore, there is urgency for PTSD screening for children after animal attacks, to reduce the psychological impact for children. This study was conducted to assess the proportion and predictive factors for post-traumatic stress symptoms among children after dog bite injuries.

METHODOLOGY

The Anti Rabies Clinic (ARC) in Victoria Hospital, Bangalore medical college and research institute is one of the few rabies prevention centers in Karnataka, treating nearly 300 pediatric patients with animal-induced injuries each year.

This study included children who were 5 to 12 years of age, were willing to participate in the study, and sought medical attention after an animal injury between December 2018, and May, 2019. Subject enrolment began after obtaining assent and informed consent from the child and his or her parents.

A longitudinal study design was used among children who sustained Dog bite injuries (Category 3). Sample Size was calculated from the study Xiaowei et al⁸ with OpenEpi software and arrived to number of 57. Consecutive sampling was used to select the cases. The exclusion criteria included cognitive impairments, psychotic diseases, speech disorders, retardation and children who have sustained other acute/chronic injuries or trauma.

The standard medical treatment for animal injuries at the emergency department consisted of postexposure vaccine prophylaxis of intradermal schedule for rabies and/or rabies immunoglobulin treatment, meticulous wound cleaning, and closure of gaping wounds (if needed).

For each patient, the following information was recorded: victim's name, age, gender, contact information, date of injury, breed of dog, anatomic location of the injury, number of wounds, circumstances of the injury, Family Apgar Scale scores and PTSD screen results. Detailed medical, psychiatric, and social histories also were obtained. One week after the ARC visit (on 7th day of ARV), the patients underwent assessment for acute stress disorder (ASD) diagnosis, by using the Child Acute Stress Questionnaire. ⁹

PTSD screening and interim history-taking were performed 3 months after the emergency department admission, by telephone or in face-to-face interviews, by using the PTSD Scale for Children and Adolescents. ¹⁰ Interviewers who conducted assessments at month 3 were not aware of the children's ASD status at 7th day. Other scales were not used in this study because animal attack wounds differ from wounds attributable to traffic accidents, which mainly involve organ damage, cranial damage, and bone fractures.

Therefore, to classify wound severity, we divided the cases into 3 groups on the basis of whether sutures and hospitalization were needed. Mild injuries required only simple medical treatment, moderate injuries required sutures in the emergency department, and severe injuries required hospitalization.

The Family Apgar Scale was used to evaluate family support and function. ¹¹ The Family Apgar Scale consists of 5 questions, each addressing one of the following constructs regarding family support and functioning: adaptability, partnership, growth, affection, and resolve.

Descriptive analyses summarized subject characteristics and the prevalence of ASD and PTSD, expressed as means and SDs. ASD or PTSD status was described separately for children in 2 age groups (5–8 years and 9–12 years). The χ^2 test was used to compare the prevalence of ASD and PTSD according to gender, age group, and injury severity.

Data were coded and entered into Excel and analysis was done using SPSS v 20.0. P values of $<.05$ were considered significant.

RESULTS

In this study, 52 pediatric patients were interviewed, accounting for 42.8% of all pediatric patients with animal injuries during the study period. There were 32 boys and 25 girls. The mean age of the subjects was 7.2 ± 2.8 (5-12). Of the 52 patients, 6 were hospitalized (severe injuries), 13 received sutures in the emergency department (moderate injuries), and the other 38 received only simple treatment (mild injuries) (Table 1). The majority of victims were injured by a dog known to them, that is, their family pet (16 of 52 children [30.7%]) or a dog known to them but not owned by them (24 of 52 children [46.15%]).

Table 1.0 Demographic Characteristics of Subjects

| Child age | |
|--------------------------------|-----------------------|
| Mean \pm SD (range) in years | 7.2 \pm 2.8 (5-12) |
| 5–8 y, n (%) | 36 (63.2%) |
| 8–12 y, n (%) | 21 (36.8%) |
| Child gender | |
| Male, n (%) | 32 (56.1%) |
| Female, n (%) | 25 (43.9%) |
| Wound severity (Category 3) | |
| Mild, n (%) | 38 (66.8%) |
| Moderate, n (%) | 13 (23.1%) |
| Severe, n (%) | 6 (10.1%) |
| Family Apgar Scale score | |
| Mean \pm SD (range) | 8.2 \pm 2.23 (3-10) |

A total of 7 (12.88%) victims met the symptom criteria for ASD. ASD occurrence was significantly higher in the severe injury group than the other 2 groups ($X^2 = 62.458$ $P = .000$). There were no statistically significant association in the occurrence of ASD according to gender ($X^2 = 3.403$ $P = .065$). Children 5 to 8 years of age were more likely than those 9 to 12 years of age to have ASD ($X^2 = 7.665$ $P = .006$ odds ratio: 2.765 [95% CI: 1.300– 5.881]). (Table 2.0)

Table 2.0 ASD among injured children (%)

| Symptoms | ASD n (%) | | |
|-----------------------------|--------------------|------------------------|---------------------|
| | Mild Injury (n=38) | Moderate Injury (n=13) | Severe Injury (n=6) |
| Dissociation ^a | 2 (5.26%) | 2 (15.38%) | 3 (50%) |
| Reexperiencing ^b | 3 (7.89%) | 5 (38.46%) | 4 (66.6%) |
| Avoidance ^b | 2 (5.26%) | 6 (46.15%) | 3 (50%) |
| Arousal ^b | 3 (7.89%) | 3 (23.07%) | 3 (50%) |
| ASD diagnosis | 4 (10.52%) | 3 (23.07%) | 3 (50%) |

^a At least 3 moderate/severe symptoms.

^b At least 1 moderate/severe symptom.

No child in any wound severity group had PTSD at the admission assessment. A total of 3 (5.26%) patients developed PTSD, including 2 patients with severe injuries and 1 patient with moderate injuries ($X^2 = 48.104$; $P < .000$). No significant difference was observed on the basis of gender ($X^2 = 0.628$ $P = .428$) or age group ($X^2 = 1.966$ $P = .161$), odds ratio: 0.498 [95% CI: 0.185– 1.342]. Family Apgar Scale scores were not significantly related to PTSD ($P = 0.781$). (Table 3.0) ASD and PTSD symptom severity scores were significantly associated ($r = 0.51$; $P = .005$).

Table 3.0 PTSD Among Injured Children (%)

| Symptoms | PTSD n (%) | | |
|-----------------------------|--------------------|------------------------|---------------------|
| | Mild Injury (n=38) | Moderate Injury (n=13) | Severe Injury (n=6) |
| Reexperiencing ^a | 1 (0.38%) | 3 (23.07%) | 3 (50%) |
| Avoidance ^b | 0 | 2 (15.3%) | 2 (33.3%) |
| Arousal ^c | 0 | 2 (15.3%) | 2 (33.3%) |
| PTSD diagnosis | 0 | 2 (15.3%) | 2 (33.3%) |

^a At least 1 moderate/severe symptom.

^b At least 3 moderate/severe symptoms.

^c At least 2 moderate/severe symptoms.

DISCUSSION

Animal-induced injuries are very common, especially among children. With the development of rabies vaccines and antibiotics, rabies occurrence and wound infection rates have been reduced significantly. For animal induced injuries, however, children may need more care from physicians, not only medical/surgical interventions but also psychological interventions. Little is known about the normal range of acute psychological responses of children in the immediate aftermath of animal attacks, which makes the identification of adverse children responses extremely difficult. Peters et al¹² demonstrated that 12 of 22 pediatric patients developed PTSD symptoms after dog bites, but no detailed data and analyses were provided. Some studies involving PTSD in children were related to acute physical injuries,^{13–15} such as traffic accidents, which are generally different from the trauma of animal attacks. This study investigated PTSD occurrence in children after animal attacks and indicated possible predictive indicators.

The reason why PTSD developed in some children is not known. However, it could be related to the intensity and aggressive character of the animal attack.¹⁶ Our study also leads to the conclusion that child victims of severe animal attacks should be considered to be at risk for PTSD and may need early psychological support. In the severe injury group, 26.3% of the children developed PTSD, compared with 9.9% and 0.4% in the moderate and mild injury groups, respectively. No significant differences in PTSD occurrence according to gender and age were observed, although girls seemed to be more vulnerable and younger children seemed to be more likely to develop PTSD. In this study, we included only patients who fully met the criteria for ASD/ PTSD, excluding patients who might have symptoms but did not meet the criteria for ASD/PTSD diagnosis. For example, 63.4% and 57.9% of the children in the severe injury group developed reexperiencing and avoidance symptoms, respectively, but only 44.7% of the children had confirmed ASD. The situation was similar for PTSD diagnosis. Additional study may be needed specifically for children with ASD/PTSD symptoms but without a specific diagnosis.

We hypothesized that less family support would contribute to posttraumatic stress symptoms in children after animal attacks. However, the study results do not support this hypothesis. ASD symptoms seem to be possible predictive indicators of PTSD. There have been numerous studies on the relationship between ASD and PTSD in adults, which revealed that 63% to 83% of patients diagnosed as having ASD develop PTSD.^{17–19} Kassam-Adams and Winston et al²⁰ examined the utility of ASD as a predictor of PTSD among 8- to 17-year-old youths after traffic accidents and found a positive relationship. Furthermore, PTSD severity was found to be strongly associated with self-reported ASD symptom severity among youths and young adults who were assessed within hours after a violent injury.²¹

Our study findings regarding the ASD-PTSD relationship indicated that ASD symptoms may be used as possible predictive parameters for PTSD in children after animal attacks. However, further investigation of the sensitivity and specificity may be needed.

Previous studies examined factors related to the development of PTSD in children, such as demographic variables (eg, age and gender), previous psychopathologic conditions, injury severity, and physiologic factors (eg, heart rate and physiologic arousal). One study of 401 adolescents 12 to 19 years of age demonstrated that female gender, perceived threat to life, and violence-related mechanisms of injury were predictive of ASD, as measured with the Impact of Events Scale Revised.²² In addition, another study found that the acute heart rate near the time of injury might be related to the development of PTSD in children after traffic-related physical injuries. However, many possible predictive indicators were not included in that study. Additional studies may take in to account possible related parameters for an overall evaluation of PTSD risk factors.

There are some limitations to this study. Firstly, we evaluated urban and suburban populations, and rural areas were not covered. Therefore, a bias might have been generated through population selection. Because dogs in rural areas are more ferocious and more-severe wounds may be more common, cases of children experiencing PTSD may be more prevalent. Therefore, similar studies among children in rural settings and in other ethnic populations would be useful. Secondly, because no existing appropriate instrument could be used for evaluation of animal attack wounds, we divided the cases into 3 groups on the basis of gross wound severity. This triage was based mainly on the judgment of the physicians in the emergency department, and systematic differences in grouping might have occurred. Future studies might adopt a wound evaluation instrument to achieve better wound severity grouping. Lastly, this study enrolled only patients >5 years of age. Future studies should develop a more patient-friendly, easier questionnaire for PTSD evaluation in younger patients.

CONCLUSION

Child victims of animal attacks with severe injury should be considered at risk for the development of PTSD. Family support was not correlated with posttraumatic stress symptoms in school-aged children after animal attacks. ASD seems to be an early predictive indicator of PTSD. ARC physicians dealing with pediatric patients after animal attacks should be encouraged to instruct the children's parents to observe the children closely after the injury, for psychological effects.

DECLARATIONS

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