

Research Application Summary

Vertebrate Animal Bites and Scratch Injuries in Patients Reporting at Kakamega Provincial General Hospital, Western Kenya, 2009

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Abstract

In developing countries, there is underestimation of the importance of vertebrate animal bites and scratches in morbidity, mortality and loss of life in public health. In 2009, a study was done to determine characteristics of vertebrate animal bite injuries and their management in patients reporting at Kakamega Provincial General Hospital (PGH) in Western Kenya. A facility health based cross-sectional study was conducted. A semi-structured questionnaire was administered to collect data from all patients reporting with animal bites to Kakamega PGH between 1st August and 31st October 2009. In addition, observation of the patient was done. Data were entered and analyzed in Epi info Version 3.4.3 software. A total of 207 bite patients were interviewed of which dog bites constituted 71.5%, human bites 16.4% followed by snake and cat bites. Twenty seven percent of dog bites were in children aged below 10 years. Ninety seven percent of the anti-rabies vaccine prescription were for animal bite wounds by cats and dogs, of which 63% ranged between 1-3 doses. Completion of anti-rabies vaccination regimen was significantly associated with age group 5-12 years ($p < 0.02$). Kenya Expanded Program for Immunization (KEPI) was the main source of the vaccine while being bitten on the upper extremities was most common. Animal bites due to dogs are common in Kakamega, with children most affected. Low dose post-exposure vaccine prescriptions were commonly done at the hospital. Public health authorities should enhance community sensitization to reduce dog bites and also develop and disseminate animal bite management guidelines to health facilities.

Keywords: anti-rabies vaccine, Kakamega, Kenya, vertebrate bites

Résumé

Dans les pays en voie de développement, on sous-estime l'importance des morsures et des égratignures d'animaux vertébrés dans la morbidité, la mortalité et les pertes de vie en santé publique. En 2009, une étude a été réalisée pour déterminer les caractéristiques des morsures d'animaux vertébrés et de leur prise en charge chez les patients déclarés à l'hôpital général provincial (HGP) de Kakamega dans l'ouest du Kenya. Une étude transversale basée sur la santé des établissements a été menée. Un questionnaire semi-structuré a été administré entre le 1 août et le 31 octobre 2009 pour recueillir des données auprès de tous les patients ayant signalé des morsures d'animaux à l'HGP de Kakamega. De plus, l'observation du patient a été effectuée. Les données ont été saisies et analysées dans le logiciel Epi info version 3.4.3. Au total, 207 patients ayant été mordu ont été interviewés, dont 71,5 % chez les chiens et 16,4 % chez les humains, suivies de morsures de serpents et de chats. Vingt-

sept pour cent des morsures de chien étaient chez des enfants âgés de moins de 10 ans. Quarante-vingt-dix-sept pour cent de la prescription de vaccin antirabique concernait des morsures d'animaux par des chats et des chiens, dont 63 % variaient entre 1 et 3 doses. Le programme de vaccination antirabique était significativement associé au groupe d'âge de 5 à 12 ans ($p < 0,02$). Le programme pour l'immunisation au Kenya (KEPI) a été la principale source du vaccin alors que la morsure sur les membres supérieurs était la plus fréquente. Les morsures d'animaux dues aux chiens sont fréquentes à Kakamega, avec les enfants les plus touchés. Les ordonnances de vaccins à faible dose après-exposition étaient couramment effectuées à l'hôpital. Les autorités de la santé publique devraient améliorer la sensibilisation de la collectivité afin de réduire les morsures de chiens et aussi élaborer et diffuser des lignes directrices sur la gestion des morsures d'animaux aux établissements de santé.

Mots clés: Kakamega, Kenya, morsures de vertébrés, vaccin antirabique

Introduction

Animal bites are a significant public health problem that is under-emphasized. An estimated 2% of the world population is bitten each year. The majority of animal bites are caused by dogs (85-90%), 5-10% are due to cats, 2-3%, are due to humans, and 2-3% are due to rodents (Mc Bean *et al.*, 2007). Bites no matter how minor are a potential source of zoonotic infections particularly rabies and a source of entry of pathogenic organisms including *Clostridium tetani* that causes tetanus. In India, the incidence of animal bites is about 17.4 per 1000 population. The annual number of person days lost due to animal bites is 38 million and the cost of post bite treatment is about \$25 million (Menezes, 2008). Animal bites though a significant public health problem have been under-emphasized due to inadequate and unreliable data. In Kenya this problem is nationwide and has not been well addressed adequately by both the public health and veterinary sectors. Animal bites are commonly inflicted in children. The consequences of animal bites are predisposition to rabies. There is no published data on animal bites in Kenya. Hence there is need for epidemiology studies and examination of the clinical management practices of animal bites so as to establish effective prevention and control. The overall objective of the study was to describe the epidemiology and management of animal bite and scratch injuries among patients reporting at Kakamega Provincial General Hospital.

The Specific objectives of this study were to: i) to determine the characteristics of the bites and the animals involved, ii) to determine the primary care bite management practices at home and hospital iii) to determine the factors associated with completion of anti-rabies vaccination course in patients bitten by rabies suspect animals.

Material and Methods

A health facility based cross-sectional study of all vertebrate bite and scratch patients reporting at Kakamega Provincial General Hospital, Western Kenya, was conducted. Data were collected using an interviewer administered semi-structured questionnaire. Data were collected on variables such as socio-demographics, anatomical site of bite, venue of the bite, species and nature of biting animal, all aspects of wound management, and post exposure treatment obtained. Observation of clinical management procedures of animal bite injuries was also done. Data were entered and analyzed using Epi info version 3.4.3 software. Univariate analysis generated frequencies of variables and measures of central location. Bivariate analysis generated crude odds ratio to measure association between the dependent variable (completion of rabies vaccination regimen) and independent variables. Logistic regression generated a final model for the factors associated with completion of the vaccination regimen.

Results and Discussions

Characteristics of animal bites and the animals involved. Two hundred and seven (207) patients reported to the hospital with animal bite wounds between the months of August and October 2009. Males were 51% of the total respondents. Dog bites constituted 72% of all the animal bites reported followed by human bites (16.4%), snakebites (16.8%), cat bites (3.4%) and others 4.5%. Of all the dog bites reported, 33.8% of them occurred in children aged 6-10 years while 35% of human bites occurred in females aged 21-25 years (Figure 1).

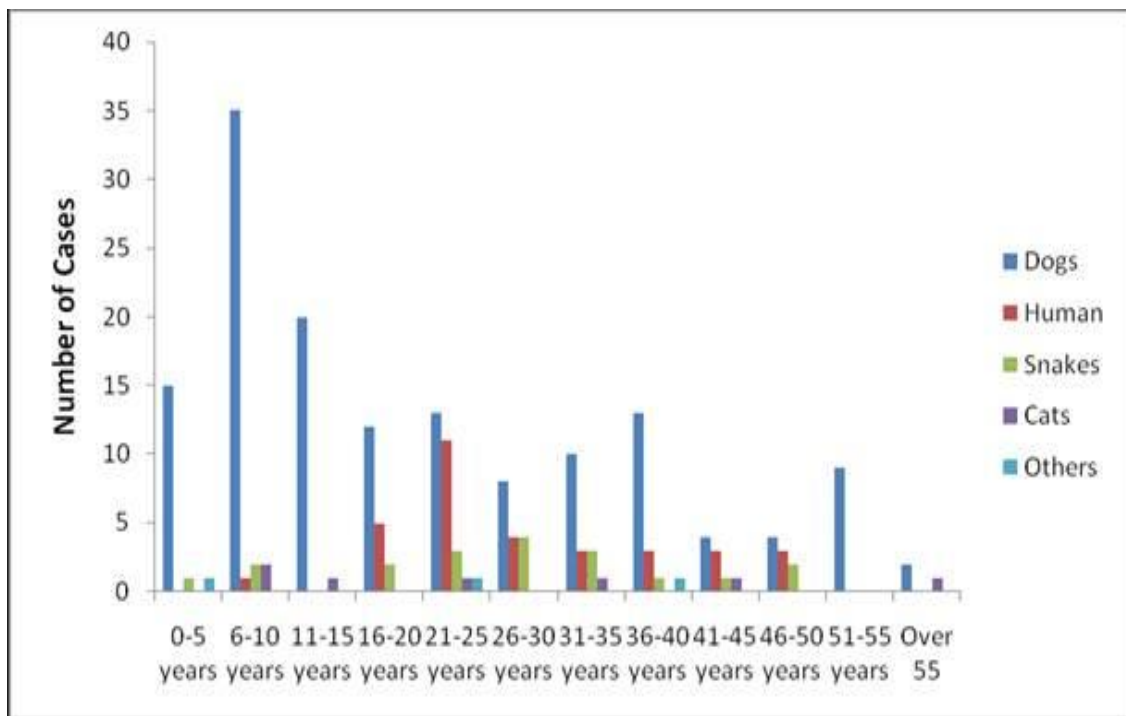


Figure 1. Demographic characteristics of patients stratified by age, sex and species

Of the dog bites, 83.8% were inflicted on the lower limb areas such as thighs, knees, and feet while 10.1% were reported in upper limb sites like shoulders and wrists. Other anatomical sites such as the thorax and head/neck had 4.7% and 1.4% bites reported, respectively. There were 34 human bites reported, 58.8% of which were inflicted on the upper limbs, 35.2% in head/neck and 2.9% in the thorax and lower limb areas. There were 14 snakebites reported of which 78.6% were in the lower limbs with the rest in the upper limbs. Cat bites reported were 7 of which 52.1% occurred in the upper limbs and the rest in the lower limbs. Other bites from rodents and lizards were inflicted on the upper limbs.

Time of occurrence of bite. Of the dog bites reported, 44.6% occurred in the morning and 29.1% at night. Of the human bites reported 44.1% occurred at night (Table 1).

Table 1. The proportion (%) of vertebrate type bites by time of occurrence reported to Kakamega Provincial General Hospital

Time of bite	Vertebrate Type				
	Dog n=148	Human n=34	Snake n=14	Cat n=7	Others n=4
Morning - 6.00am-12noon	44.6	35.3	14.3	14.3	50.0
Afternoon - 1.00 pm-3.00pm	15.5	5.9	21.4	14.3	50.0
Evening - 4.00pm-6.00pm	29.1	14.7	35.7	42.9	-
Night - 7.00pm-5.00am	10.8	44.1	28.6	28.6	-

Place of occurrence and exposure circumstances of bites. Of dog bites reported, 47.3% occurred along roads or pathways, while 47.1% human bites occurred at home. The unprovoked bites were 84.4% for the dogs, and 85.7% for the snakes. Most of the cat bites (57.1%) were of the provoked type (Table 2).

Table 2. The proportion (%) of the vertebrate type bites by exposure circumstances among the patients reporting to Kakamega Provincial General Hospital

Exposure circumstance	Vertebrate Type				
	Dog n=148	Human n= 34	Snake n=14	Cat n=7	Others n=4
No provocation	84.4	-	85.7	28.6	75.0
Ordinary interaction (feeding, grooming)	1.4	-		14.3	
*Provoked	2.7	-	14.3	57.1	25.0
Commanded to attack	2.0	-		-	
Moved close to young ones	7.4	N/A		-	
Playing/petting	1.4	N/A		-	
Fight/separating fight	N/A	100	N/A	-	

*Provoked was defined as the animal having been kicked, hit or struck by a person with any object or part of the person's body or any part of the animal's body having been kicked

Animal ownership. Ninety two percent of the reported dog bites were inflicted by dogs of known ownership (family or neighbor).

Animal bite management practices

Animal bite management practices at home before reporting to hospital. Following an animal bite, 9% of the wounds were immediately washed with water and soap, while 5% were managed by taking either antibiotics or analgesics. Sixty six percent of the bite wounds were managed by traditional first aid methods such as paraffin, potassium permanganate and blood from the biting dog. Of the snakebite wounds, a tourniquet was applied in 86% cases while 7% first reported to a traditional healer for herbs, before reporting to hospital.

Animal bite wound management at the hospital. Of the animal bite wounds received at the hospital, 60.4% received antibiotic treatment such as Amoxicillin, Floxapen, Penicillin and Ampiclox. Tetanus toxoid was administered in 58.5% of the cases, while 0.9% were put on anti-retroviral therapy. Prescription of anti-rabies vaccine was done for 96.6% animal bite wounds by cats and dogs of which 62.6% ranged between 1-3 doses. Of all the animal bites that received anti rabies vaccine 27% completed the prescribed dose. The period between the animal bite and receiving the first anti-rabies dose ranged from 0 to 232 days with a mode of 2 days. The anti-rabies vaccine in 70.9% animal bites was sourced from the dispensing chemists and 29.1% from KEPI.

Bivariate analysis of factors associated with completion of prescribed anti-rabies doses in dog and cat bites.

Sourcing anti-rabies vaccine from KEPI, sustaining bite on the upper extremities and belonging to age group 5-12 years were significantly associated with completion of the prescribed anti-rabies vaccination course.

Table 3. Bivariate analysis of factors associated with completion of prescribed anti-rabies doses in dog and cat bites

Characteristics	Anti-rabies dose completion		
	COR*	95%CI	P-Value
Age group 5-12	2.62	1.21-5.67	0.023
KEPI as vaccine source	2.84	1.21-6.38	0.018
Bite on the upper extremities	0.60	0.30-1.25	0.022

* COR Crude Odds Ratio

Discussion

In this study, dogs were found to be the main biting animals in the area and like in many other studies, children were at higher risk of dog bites (Ostanello *et al.*, 2004; Steele *et al.*, 2007). Children aged 5-10 years were at a considerable behavioral risk because of their mobility, curiosity, lack of knowledge on animal behavior, their short stature and frequent association with animals. Children in this age group were mainly bitten on the lower extremities unlike in studies done in developed countries that showed that children were commonly bitten on the head/neck and arms more than any age group. The highest percentage of dog bites in a city in the Unites States (US) was from the German shepherds (Gail and O'Rourke, 1998), likely one to this being a large breed and is therefore more likely to bite the head/neck of a child as these are the closest to its mouths. In Kakamega, most dogs owned are the local small breeds (basenji) which are unlikely to reach the head/ neck. Most children were bitten in the event of running away from the biting animal increasing the chance of bite occurring on the lower extremities.

The most significant source of dog bites in this study was those with known ownership as reported elsewhere. Majority of the bites occurred away from the owner's compound and in the morning when children were going to school. Dog owners were generally unaware of their responsibility in safeguarding the public from injury and let their dogs to roam freely in search of food. Addressing responsible ownership and animal control law enforcement will greatly reduce the incidence of dog bites in Kakamega.

Human bites were second in prevalence to dog bites in this study. Other studies in the developed countries place human bites third following dog and cat bites (Sinclair and Zhou, 1995; Pretty *et al.*, 1999). In this study, human bites were significantly high and common in females (61.8%). The victims and aggressors were mainly females. These results compare well with other studies done in Tanzania and Nigeria (Obukwe, 2002; Shubi *et al.*, 2008) which also established that women were at higher risk than males. African countries share many cultural practices such as polygamy that may promote jealousy among women leading to fights. Human oral flora contains multiple species of bacteria and can result in serious infections. This coupled with the possible transmission of blood-borne viral diseases through human bites makes it necessary for the Ministry of Public Health and Sanitation to set guidelines on proper management of human bites in the health facilities at all levels.

There may be need to educate the community and especially females on the dangers of human bites. It is possible that women prefer using teeth instead of fists with a hope of inflicting maximum harm especially disfigurement of the face as most fights were reported to come from suspected extra-marital affairs. The bites were common in individuals aged 21-30 years and were frequent at night. Human bites are expected to be high in this age group due to the social activities they engage in which most often end up in conflicts that are settled through fights. The bites are common at night when people are more likely to be engaged in these social activities like alcohol drinking.

In this study, use of tourniquets in snakebite patients was high (93%). This is consistent with findings obtained in a study on treatment seeking behaviors among snakebite patients in Mymensingh, Bangladesh. This too was a hospital-based study and showed a frequency of 100% which established that application of tourniquets was popular (79%). Use of tourniquets or compression bandages was based on research in Australia, which showed that they slowed venom absorption in animals. Studies that are more recent show that they are not useful (Chandio *et al.*, 2000). This misconception may not have been corrected hence of the increased use of tourniquets. From the study, low level of education and unemployment were associated with a higher probability of an animal bite. It would therefore be important to design communication messages that target this group of population in the society. This factor may also be a contributory factor on the increased poor home management of animal bite wounds. Only 8% of the study participants washed the bite wound with soap and water as recommended while a majority of patients applied inappropriate first aid techniques. Higher rates (58%) of appropriate wound washing have been reported in Uganda (Fevre *et al.*, 2005). The lower rates observed in this area of study may be attributed to the high awareness levels on bite wound management and the cultural practices which are more frequently used. Data from this study showed that clinical management of animal bites was poor and the management of wounds inflicted by dog best exemplifies this. Wound washing at the hospital was not a common practice as it was practiced in only 8.2% of the cases reported. None of the patients received anti-venom treatment and 14% of the snakebite patients were given intravenous fluids. Clinical management of bite wounds is therefore an area that MOPHS needs to strengthen.

Bivariate analysis of a subset of data comprising of all dog and cat bites showed that sourcing anti-rabies vaccine from KEPI, sustaining bite on the upper extremities and belonging to age group 5-12 years were significantly associated with completion of the prescribed anti-rabies vaccination course. Parents give priority to children in treatment with a view that they are at higher risk of infection. This in essence is a proven fact and was observed in the study as the two deaths due to rabies were in children less than 10 years of age. Given the low vaccination coverage of dogs and cats reported by Perry *et al.* (1995), all bite exposures represent a potential risk of rabies and all the exposed persons should complete the anti-rabies course. Vaccines from KEPI are either free or subsidized compared to the dispensing chemists and people tend to prefer drugs from Government organizations. This is a pointer that in order to improve anti-rabies completion rates in animal bite patients in Kakamega, KEPI vaccine stocks should be increased to meet the demand. With the many power failures with no alternative power source, the dispensing chemists may not be suitable to stock vaccines that require low temperatures.

Limitations of the Study

Only injuries reported to Kakamega provincial hospital were included. Injuries treated in other health facilities and those injuries where no formal care was obtained, were not included. However, the bite characteristics are not expected to be very different. Accessibility to health facilities, nearness to major roads, physical barriers (forests), cultural practices and level of education are major key factor that affect prevalence of bites in the study area.

Conclusions

Animal bites due to dogs are common in Kakamega and mainly affect children aged below 10 years. Low dose post-exposure vaccine prescriptions are commonly done at the hospital. Home care of bite wounds is inadequate particularly for bite wounds inflicted by dogs and snakes. There is need for education of the public on responsible dog ownership such as obeying leash laws, timely rabies vaccination and controlled breeding and appropriate first aid techniques in case of an animal bite. The local authority in collaboration with the Veterinary department should enforce animal control by laws. Improved surveillance of animal bites in humans with accurate and complete reporting is essential for a bite prevention program. Information collected should include demographics of the patient to identify population at risk, thus allowing for targeted education programs. Improved surveillance will necessitate collaboration between animal and human health services. This involves reporting animal bites to the veterinary officer to ascertain their health status within ten days. The Ministry of Public Health and Sanitation should control and regulate rabies vaccination in humans and come up with animal bite management guidelines for the public, veterinary and medical staff. Children should be educated on safety around dogs.

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