

Original Research Article

**Epidemiologic Features Of Dog Bites In Babylon Province During The
Years 2012-2016**

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Abstract

Dog bites is a public health problem especially in low and middle income countries including Iraq in which epidemiologic studies on dog bites and rabies are very scarce. A descriptive cross sectional study was conducted using Time Person Place epidemiologic model. Male were significantly more predominate and younger than females victims $p < 0.001$. Children under ten years of age and students constituted the majority of dog bites cases (34.7%) and (37.7%) respectively. The study revealed that one sixth of dog bites victims didn't receive prophylactic anti rabies vaccine, only 17.8% of them had completed the five recommended doses. Lower limbs were the main body site exposed to biting injuries which constituted 73.7% followed by upper limbs (20%), February and March showed the highest proportion of dog bites (24.7%). the majority of dog bites (36.6%) were reported in Al-Hashmia district.

The problem of dog bite is an important health problem in Babylon affecting mainly male children more than four fifth of victims didn't complete the recommended anti rabies prophylactic vaccination, strategic preventive health plan is strongly requested to prevent and control this health problem.

Key Words: Epidemiology, dog bites, Babylon, Iraq.

السّمات الوبائية لعضّات الكلاب في محافظه بابل خلال السّنوات ٢٠١٢_ ٢٠١٦

الخلاصة

عضّات الكلاب مشكلة صحية عامة وخاصة في البلدان المنخفضة والمتوسطة الدخل بما في ذلك العراق والذي فيه الدراسات الوبائية عن عضّات الكلاب وداء الكلب نادرة جدا. وأجريت دراسة وصفية مقطعية باستخدام النموذج الوبائي الوقت الشخص المكان. وكشفت هذه الدراسة ان الذكور هم أكثر عرضة لعضّات الكلاب بشكل ملحوظ وأصغر من الإناث ويفارق احصائي معنوي $p < 0.001$. وشكل الأطفال دون سن العاشرة من العمر والطلبة غالبية حالات عضّات الكلاب (٣٤,٧ في المائة) و (٣٧,٧ في المائة) على التوالي. وكشفت الدراسة أن سدس ضحايا عضّات الكلاب لم يحصلوا على لقاح مضاد للوقاية من داء الكلب، ١٧,٨٪ منهم فقط أكملوا الجرعات الخمس الموصى بها. وكانت الأطراف السفلية هي موقع الجسم الرئيسي الأكثر تعرضا للعض والذي شكل ٧٣,٧٪ تليها الأطراف العليا (٢٠٪) و فبراير ومارس أظهرت أعلى نسبة لعضّات الكلاب (٢٤,٧٪). كما اوضحت هذه الدراسة ان غالبيه عضّات الكلاب (٣٦,٦٪) تم تسجيلها في قضاء الهاشمية .

مشكلة عضه الكلب هي مشكلة صحية هامة في بابل التي تؤثر بشكل رئيسي على الأطفال الذكور، أكثر من أربعة اخماس الضحايا لم يكمل التطعيم الوقائي الموصى به لمكافحة داء الكلب، والمطلوب وضع خطة وقائية استراتيجيّة لمنع ومكافحة هذه المشكلة الصحية والحد منها.

الكلمات المفتاحية : وبائيات، عضّات الكلاب، بابل، العراق.

Introduction

Humans have lived alongside dogs for 14,000 years at least, [1,2]. They have also been familiar with their diseases, which became more common as populations and their animals congregated in the cities that arose in Mesopotamia [3-5]. Distinct copies described Sumerian rules and regulations attesting to the fact that a causal link between the bite of a rabid animal and a human death from rabies was well recognized in Iraq almost 4000 years ago [6].

Dog bites are a serious health problem that cause both physical and emotional damage to victims and considerable cost to communities [7] and constituted the most common animal bites [8,9].

Globally, estimates indicate that human mortality (due to endemic canine-mediated rabies) is highest in Asia. This is closely followed by Africa; however estimates of burden have always been uncertain due to the absence of reliable data, [10].

One of the important methods of controlling rabies is by studying the problem and carrying out interventions to limit the number of dog bites [11].

Rabies, caused by bites of dogs, is almost always fatal after the onset of clinical signs. The disease can efficiently be averted by avoiding contact with dogs and post exposure prophylaxis [12]. Canine rabies causes approximately 59,000 human deaths globally, over 3.7 million disability-adjusted life years, and 8.6 billion USD economic losses annually [13], the majority of deaths occurring in Africa and Asia [14].

World Health Organization (WHO) supports targets for elimination of human rabies transmitted by dogs in Asia by 2020, aims to halve the currently estimated number of human rabies deaths in endemic countries [15], dog bites lead to different serious other complications such as amputations, Physical scarring, emotional injuries; post-traumatic stress disorders, depression, and cynophobia which is the fear of dogs. Fear of dogs can isolate a

person from families or friends that have dogs in their homes[16-17].

In Babylon province there is no data of human rabies death from 2010 to 2014 and the studies about dog bites attacks are very scarce [18].

This study was conducted to determine the epidemiologic features of dog bites among victims who seek healthcare in Babylon province during five years period.

Materials and Methods

This study evaluated dog bites cases registered in the communicable diseases unit-public health department in Babylon health directorate for 5-years period (January 1, 2012 to December 31, 2016). The collection and analysis of data study took about four months from February through May 2016, the registered data were checked by the researcher himself single handly and compared with other sources of data in Babylon veterinary hospital to increase the accuracy of the collected data.

A descriptive cross sectional study was applied using Time Person Place epidemiologic model, this descriptive epidemiologic model is suitable for describing the demographic characteristics of diseases and health related events depending on available data [19].

The approval of health authority was obtained, the following variables were studied: time factors include months and years to explain the frequency of occurrences of dog bites according to time and to explain the trend of this health problem in the province, dog bites were categorized according to places of occurrences by districts (counties) of the province; variables related to victims (personal characteristics) were studied such as gender, age, occupations, the sites of dog bite (exposure) and the vaccination status. The collected data were analyzed by using Statistical Package of Social Science (SPSS) version 21, simple descriptive statistics and inferential statistics (Chi square and t tests were applied to identify the significant of difference between variables). P value less than 0.05 considered as a level of statistical significant.

Results

Figure 1 shows the distribution of persons with dog bite according to age. Among

studied group majority (34.7%) were children below or equal 10 years.

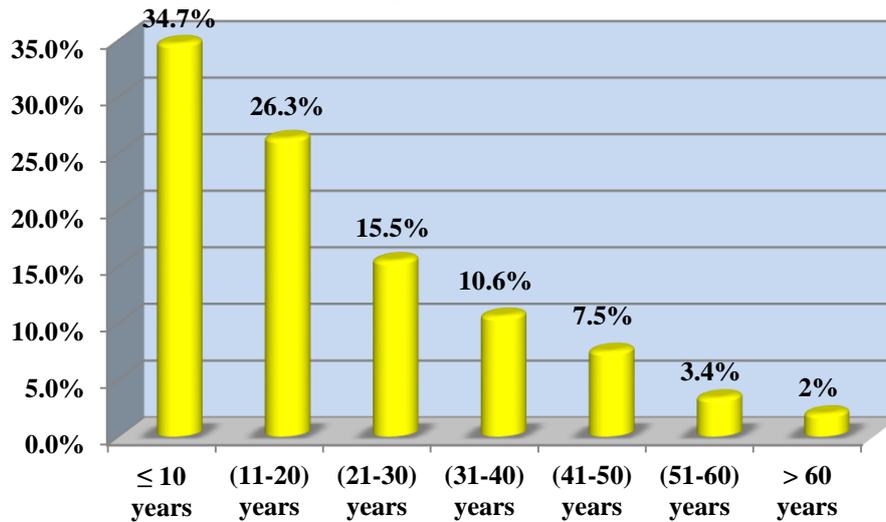


Figure 1: Distribution of Patients with Dog bite According to age

Figure 2 shows the distribution of persons with dog bite according to occupation.

Among studied group majority (37.7%) were students.

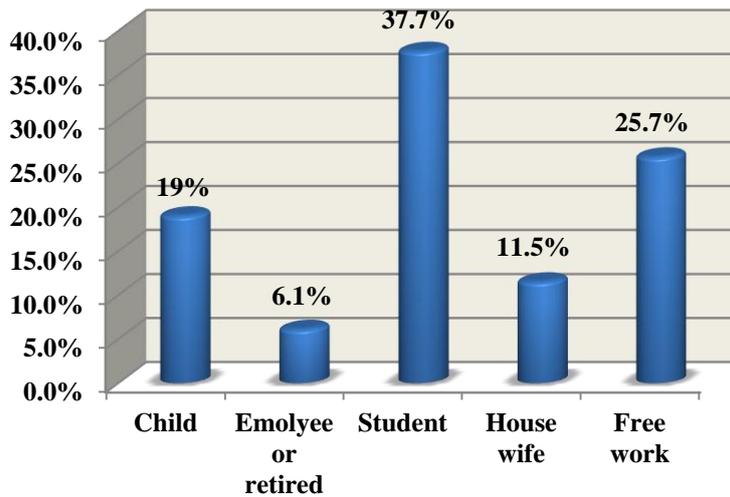


Figure 2: Distribution of Patients with Dog bite According to Occupation

Table1 shows the distribution of persons with dog bites according to year of exposure. Among the studied group the

majority (36.5%) expose to dog bite during 2013.

Table 1: Distribution of dog bites according to year of exposure

Year of exposure	No.	%
2012	1463	11.5
2013	4658	36.5
2014	3135	24.6
2015	2310	18.2
2016	1171	9.2
Total	12737	100.0

Table 2 shows the distribution of persons with dog bite according to place of exposure. Among the studied group the

majority (36.6%) exposed to dog bite in Al-hashmia district.

Table 2 : Distribution of dog bites according to place of exposure

Place of bite	Number of bite for male	Number of bite for female	Total
City center	1980 (20.9%)	652 (20.2%)	2632 (20.7%)
Al hashmia	3433 (36.1%)	1227 (37.8%)	4660 (36.6%)
Al mahaweil	2520 (26.5%)	866 (26.7%)	3386 (26.6%)
Al masiab	1565 (16.5%)	494 (15.3%)	2059 (16.1%)
Total	9498 (100.0%)	3239 (100.0%)	12737 (100.0%)

Table 3 shows the distribution of persons with dog bite according to time of

exposure. Among studied group (12.4%) expose to dog bite during February.

Table 3: Distribution of dog bites according to time of exposure (N=12311)

Months of exposure	Number of bite for male	Number of bite for female	Total
January	1001 (10.9%)	299 (9.6%)	1300 (10.6%)
February	1117 (12.1%)	415 (13.3%)	1532 (12.4%)
March	1103 (12.0%)	406 (13.0%)	1509 (12.3%)
April	1047 (11.4%)	369 (11.8%)	1416 (11.4%)
May	632 (6.9%)	224 (7.2%)	856 (7.0%)
June	540 (5.9%)	195 (6.2%)	735 (6.0%)
July	646 (7.0%)	225 (7.2%)	871 (7.1%)
August	651 (7.1%)	223 (7.1%)	874 (7.1%)
September	686 (7.5%)	238 (7.6%)	924 (7.5%)
October	578 (6.3%)	193 (6.1%)	771 (6.3%)
November	485 (5.3%)	135 (4.3%)	620 (5.0%)
December	695 (7.6%)	208 (6.6%)	903 (7.3%)
Total	9181 (100.0%)	3130 (100.0%)	12311 (100.0%)

no available data of time of occurrence for the remaining 426)

Figure 3 shows the distribution of persons with dog bite according to site of bite.

Among studied group majority (73.7%) expose to dog bite at the lower limbs.

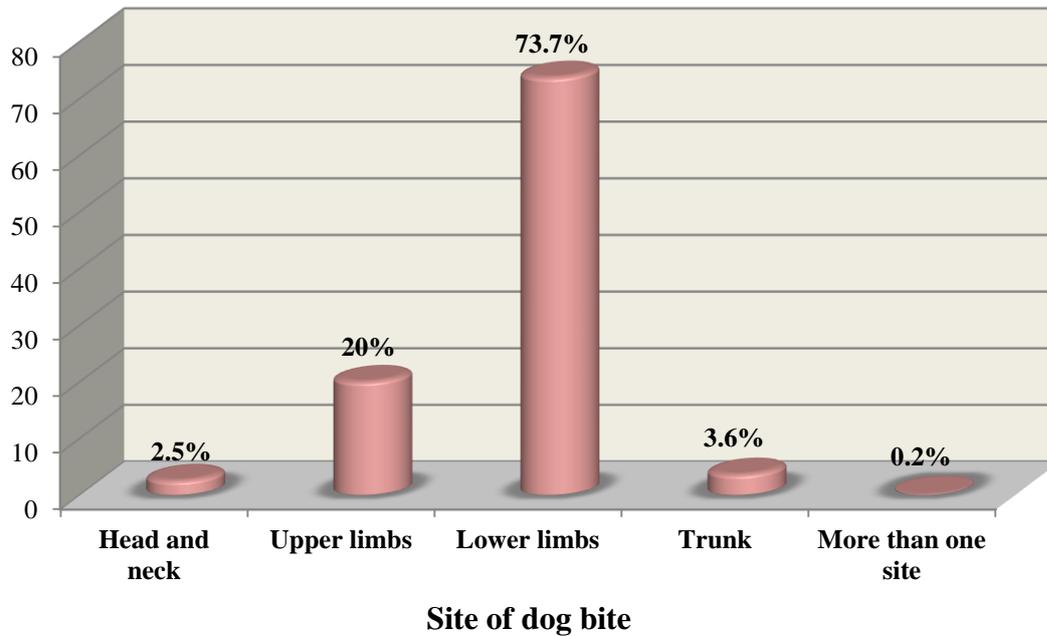


Figure 3: Distribution of Patients with Dog bite According to site of bite

Table 4 shows the distribution of patients with dog bite according to number of

vaccine doses. Among studied group (17.8%) of person completed all five doses.

Table 4: Distribution of persons with dog bites according to number of doses of anti-rabies vaccine taken

No. of vaccine doses	Male	Female	Total
No vaccine used	1520 (16.0%)	476 (14.7%)	1996 (15.7%)
One dose	1619 (17.0%)	541 (16.8%)	2160 (17.0%)
Two doses	1432 (15.1%)	525 (16.2%)	1957 (15.4%)
Three doses	1550 (16.3%)	548 (16.9%)	2098 (16.4%)
Four doses	1680 (17.7%)	578 (17.8%)	2258 (17.7%)
Five doses	1697 (17.9%)	571 (17.6%)	2268 (17.8%)
Total	9498 (100.0%)	3239 (100.0%)	12737 (100.0%)

Table 5 shows mean differences of age (years) according to gender for patients expose to dog bite. There were significant

differences between means of age by study groups.

Table 5: The mean differences of age according to gender

Variable	Gender	No.	Mean \pm SD	t-test	P-value
Age (years)	Male	9498	20.28 \pm 15.48	-5.554	<0.001*
	Female	3239	22.22 \pm 17.69		

*p value \leq 0.05 was significant

Table 6 shows the association between number of bites and study variables including (year of exposure, occupation

and place of exposure). There was significant association between number of bites and study variables.

Table 6: Association between number of bites and study variables

Study variables	Number of bites			χ^2	P-value
	Single	Multiple	Wound or scratch		
Year of exposure				4048.44	<0.001*
2012	172 (1.8)	39 (6.8)	1252 (44.8)		
2013	3565 (38.1)	314 (54.4)	779 (27.9)		
2014	2650 (28.3)	116 (20.0)	369 (13.2)		
2015	1981 (21.2)	73 (12.7)	256 (9.1)		
2016	996 (10.6)	35 (6.1)	140 (5.0)		
Total	9364 (100.0)	577 (100.0)	2796 (100.0)		
Occupation				28.31	<0.001*
Child	1712 (18.3)	112 (19.4)	593 (21.2)		
Employee or retired	568 (6.1)	36 (6.2)	180 (6.4)		
Student	3534 (37.7)	214 (37.1)	1052 (37.6)		
House wife	1111 (11.9)	85 (14.7)	269 (9.6)		
Free work	2439 (26.0)	130 (22.6)	702 (25.1)		
Total	9364 (100.0)	577 (100.0)	2796 (100.0)		
Place of exposure				1604.46	<0.001*
City center	1539 (16.4)	217 (37.6)	876 (31.3)		
Alhashmia	4189 (44.7)	147 (25.5)	324 (11.6)		
Al mahawiel	1951 (20.8)	130 (22.5)	1305 (46.7)		
Al-misiab	1685 (18.0)	83 (14.4)	291 (10.4)		
Total	9364 (100.0)	577 (100.0)	2796 (100.0)		

*p value ≤ 0.05 was significant.

Table 7 shows the association between number of vaccine doses and gender. There

was no significant association between number of vaccine doses and gender.

Table 7: Association between number of vaccine doses and gender

Study variable	Gender		χ^2	P-value
	Male	Female		
No. of vaccine doses			5.454	0.363
0	1520 (16.0)	476 (14.7)		
1	1619 (17.0)	541 (16.7)		
2	1432 (15.1)	525 (16.3)		
3	1550 (16.3)	548 (16.9)		
4	1680 (17.7)	578 (17.8)		
5	1697 (17.9)	571 (17.6)		
Total	9498 (100.0)	3239 (100.0)		

*p value ≤ 0.05 was significant.

Discussion

Animal bites pose a serious public health threat both in developed and developing nations [20].

The total number of dog bite victims estimated in Babylon province during the study period (2012-2016) was 21519 cases the average number of dog bites in each

year is 4303 according to population statistical data of Babylon province the average number of population per year in the study period was 1730000, (only 12737 reported cases have completed data which constituted 59.2% of total dog bites cases). The rate of dog bites in this study is 249 per 100000 population, the real number

could be more because many people do not seek medical advice or using both private health services and home therapy leading to under reporting of the real burden of this problem in Iraq, This rate is higher than that reported by other researchers in Islamic Republic of Iran who estimated (144/100000 population) [7].

The studied epidemiological characteristics showed highly significant differences towards male victims who were older than female victims, this finding is similar to the finding reported by other local study carried out in Baghdad [21]. In this study the age-group of (less than 10 years) was most frequently exposed to dog bites which constituted (34.7%), many other authors [22-24] revealed that children under 15 years of age were victims of dog bites, the bites appeared to be provoked by an interaction of the child with dogs.

The highest reported victims was during the year 2013 compared to other years, the frequency of multiple dog bites is significantly higher in this year this may be explained by the high number of stray dogs and weak killing attacks implemented in the province due to in security condition together with poor environmental and municipality activities or may be due to the temporary improvement in reporting and recording activities. In our study, there was an evident of increasing of number of dog bite attacks during February and March months, while in Ethiopia [25], there was no significant peak in the monthly distribution of dog bites, while the time of occurrence of dog bite victims living in Ghana [26] and Chandigarh, India [27] showed high number of cases during summer months, dogs being warm blood animals with temperature homeostatic mechanism, have activities relatively independent of temperature [28]. This study shows that the highest number of patients lived in Al-hasmia district which has a large numbers of villages, this finding is similar to the findings of other international studies [29,30].

Dog bite injuries mainly involved the lower extremities this finding goes with finding reported by other researchers [31-33], this may be explained by the fact that

legs being considered the nearest site to be attacked, our results contradict the findings of Sheikholeslami in Iran who found that dog related lesions was involving the upper extremities [7], while a study on children performed by Chaim et al in South Australia between the years 2009 and 2011 showed that the head and neck region constituted the most common location for injuries [34]. Five doses World Health Organization regime of prophylactic vaccine was followed in our country, one dose of vaccine is administered intramuscularly on days 0, 3, 7, 14, and 28. Injections must be given in the upper arm (deltoid region) or, in small children, into the anterolateral thigh muscle [35,36] however, pre-exposure prophylaxis does not eliminate the need for prompt post exposure prophylaxis [37, 38].

In this study 14.7% patients received the first post prophylactic anti rabies, this proportion of unvaccinated patients is much higher than that reported in a study conducted in Philippine by Quiambao et al who found that the first dose of rabies vaccine was administered to 98.5% of the study population. Rabies vaccination for the second and third dose was continued, as documented in their records, in 53.8% and 43.5%, respectively, these figures of vaccination coverage are higher than our findings [38] this may be related to the better level of Philippines' awareness and well established epidemiologic surveillance.

In conclusion there is a persistence dog bites public health problem in Babylon province, children are at high risk, more in males, intra provincial variation was noted with a peak of dog bite attacks in February and March months, lower extremity are the most common region to be bite by dogs, only one sixth of victims had completed the prophylactic anti rabies vaccine.

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References

1. Dayan, T. Early domesticated dogs of the Near East. *J. Archaeol. Sci.* 1994, 21, 633–640.
2. Thalmann O, Shapiro B, Cui P, Schuenemann VJ, Sawyer SK, Greenfield DL, Germonpré MB, Sablin MV, López-Giráldez F, Domingo-Roura X, et al. Complete mitochondrial genomes of ancient canids suggest a European origin of domestic dogs, *Science* **2013**, 342: 871–874.
3. Zuckerman MK, Harper KN, Barrett R, Armelagos GJ. The evolution of disease: Anthropological perspectives on epidemiologic transitions. *Glob. Health Action* **2014**. [CrossRef] [PubMed]
4. Greger, M. The human/animal interface: Emergence and resurgence of zoonotic infectious diseases. *Crit. Rev. Microbiol.* **2007**, 33, 243–299.
5. Rashidi, J.S. Paleoepidemiology of Mesopotamia and the ancient Near East: The impact of zoonotic diseases and population demographics on infectious disease patterns. Ph.D. Thesis, University of California, Los Angeles, CA, USA, 2011.
6. Yuhong, W. Rabies and rabid dogs in Sumerian and Akkadian literature. *J. Am. Orient. Soc.* 2001, 121, 32.
7. Shetty RA Chaturved S and Singh Z .Profile of animal bite cases In pune. *J.com . dis.* 2005 ; 37 (1) : 66-72
8. Karbeyaz K ,Ayranci U.A Forensic and Medical Evaluation of Dog Bites in a Province of Western Turkey. *J. Forensic sciences.* 2014;59(2):505-509.
9. *Sheikholeslami NZ, Rezaeian M, Salem Z.* Epidemiology of animal bites in Rafsanjan, southeast of Islamic Republic of Iran, 2003–05. *Eastern Mediterranean Health Journal*; 2009; 15(2):455-58.
10. WHO, 2016 Technical report Worldwide distribution of rabies disease <http://www.who.int/rabies/epidemiology/en/w>
11. Agarwal A, Khan AM, Sharm GKI. Prevalence of Dog Bites in Rural and Urban Slums of Delhi: A Community-based Study. *Ann Med Health Sci res*; 2016, 6(2): 115–119.
12. WHO. World Survey of Rabies No. 32. 1996. [Last cited on 2015 Apr 03]. Available from: https://www.extranet.who.int/iris/restricted/bitstream/10665/64429/1/WHO_EMCDZI_98.4.pdf .
13. Hampson K, Coudeville L, Lembo T, Sambo M, Kieffer A, Atlan M, et al. Estimating the global burden of endemic canine rabies. *PLoS Negl Trop Dis.* 2015;9: e0003709.
14. *BMJ* 2015; 350 doi: <https://doi.org/10.1136/bmj.h2189>.
15. WHO Fact Sheet. Geneva: World Health Organization; [Last accessed on 2013 Nov 27]. Available from: <http://www.who.int/mediacentre/factsheets/fs099/en/>
16. Matthew Dolman. Complications Associated with Dog Bites. 08.19.2015
17. http://apps.who.int/neglected_diseases/neglected_data/rabies/rabies.html
18. Gordis L. *Epidemiology*, fifth edition, Elsevier, 2015:230-7
19. O'Neil ME, Mac KA, Gilchrist J. Epidemiology of non-canine bite and sting injuries treated in US emergency department, 2001-2004. *Public Health Rep.* 2007;122(6):764-75.
20. Thabit MF. Five year-analysis of reported dog bites in Baghdad city. *Al-kindy Col Med J.* 2012; 8 (2):151-157
21. Stull WJ, Hodge RR. An analysis of reported dog bites : Reporting Issues and the Impact of un owned Animals. *J. Envir Health* , (2000) Vol . 62.
22. Nogalski A , Jankiewicz I , Cwik G , Karsk : J , Matuszewski I. Animals related injuries treated at the department of trauma and Emergency Medicine , Medical University of Lublin. *Ann. Arqic . Enviro. Med .*(2007) 14 (1) : 57 -61.
23. Morgan M, Plamer J. Dog bites. *BMJ*; (2007)Feb 24; 334(7590): 413-417.
24. Yimer E, Newayeslassie B, Teferra B, Mekonnen Y, Bogale Y. Zewde B, Beyene M, Bekele. A Situation of Rabies in Ethiopia: A retrospective study 1990-2000, *Ethiop. J. Health Dev.* 2002; 16(1): 105-112
25. Belcher WD, Wurapa FK And Autora C.O.D. Endemic Rabies in Ghana. *AM. J. Trop. Med. Hyg.* 2000;25(5): 724-729.
26. Slaria M and Singhi CS, Profile of patients attending pediatric Emergency Service at Chandigarh. *Ind J Pediatrics*; 2009; 15(2): 70-8.
27. Hon KL, Fu CC, Chor CM, Tang PS, Leung TF, Man CY. Issues associated with dog bite injuries in children and adolescents

- associated at the Emergency Department. *Paediatr. Emerg Care*, 2007; 23(7) :445-9.
28. Bahonar AR, Bokaie S, Khodaveirdi KH, Nikbakht Boroujeni GH, Rad MA. A Study of Rabies and the Frequency of Animal Bites in the Province of Ilam, 1994-2004. *Iranian J Epid*. 2008;4:47–51.
 29. Amiri M, Khosravi A. Epidemiological study of animal bite cases in the Shahrood city- *J Knowledge Health*. 2009;4:41–3
 30. Thabit Mf. Faraj RA. Epidemiology of dog bites in Baghdad city, 2010. *Altaqni Journal*. 2012; 25(2):50-55
 31. Dwyer JP, Douglas TS, van As AB. Dog bite injuries in children – a review of data from a South African paediatric trauma unit. *S Afr Med J* 2007; 97: 597-600.
 32. Acharya R, Sethia R, Sharma G, Meena R. An analysis of animal bite cases attending anti-rabies clinic attached to tertiary care centre, Bikaner, Rajasthan, India. *Int J Community Med Public Health* 2016;3:1945-8.
 33. Chiam SC, Solanki NS, Lodge M. Higgins M, Sparnon AL. Retrospective review of dog bite injuries in children presenting to a South Australian tertiary children's hospital emergency department. *J. Paediat and Child Health*.2014; 50,(10): 791–794.
 34. World Health Organization . WHO Expert Consultation on Rabies. WHO; Technical Report Series 982. 2013; Second Report. Geneva.
 35. Frequently Asked Questions on Rabies - 2013 World Health Organization.
 36. Brooks, GF, JS Butel and SA Morse, 2004. *Medical Microbiology*. 23rd ed. Singapore: McGraw Hill: 575-581.
 37. Moges N. Epidemiology, Prevention and Control Methods of Human Rabies. *International Journal of Basic and Applied Virology*.2015; 4(1): 22-15.
 38. Quimb BP, Dy Tioco HZ, Dizon RM, Crisostomo ME, Laot TM, Teuwen DE. Rabies Post-Exposure Prophylaxis in the Philippines: Health Status of Patients Having Received Purified Equine F(ab')₂ Fragment Rabies Immunoglobulin (Favirab). *PLoS Negl Trop Dis* 2008 ,2(5): e243