ORIGINAL ARTICLE

Occurrence of Rabies and Dog Bite in Rawalpindi District, Pakistan

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Author`s Contribution

[1,2] *Conceived the idea of research and designed the study*

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[1, 6, 7] *Data analysis and manuscript writing*

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ABSTRACT

Background: Rabies is a viral disease of brain and central nervous system. Globally, 60,000 people die of rabies per year and for Pakistan, nobody knows exact figures. This is first study on occurrence of rabies and dog bite in different habitats of the Rawalpindi district, Pakistan.

Materials and Methods: A questionnaire based survey was carried out from May, 2010 to December, 2012 in randomly selected three areas of the Rawalpindi city, three towns and 16 villages of the district. Data on dog bites was also collected from National Institute of Health (NIH) Islamabad, Pakistan.

Results: A total of 1860 households were surveyed and only 19.13% (n=356) household respondents reported the human victims of rabies in the study area. Majority (n=316) of them reported dog as a vector of rabies. Only 955 respondents reported 1285 dogs rabid in the area and 547 households reported their livestock died of rabies. About 403 cows, 159 buffaloes, 111 goats and 64 donkeys were rabid in the area. Furthermore, 459 households reported male bias dog bites in the house members (n=332). After a dog bite, 24% people got spiritual treatments, 40% went to hospitals and 25% did the both while 11% did nothing. A total of 4666 dog bite cases were reported in NIH from 2005-2011.

Conclusions: Numbers of rabies victim increased in the last decade and people in villages suffered from rabies more than people in city or town. The data revealed that dog bite cases increased in the area and dog bite cases recorded in NIH per year were underestimated as 35% of victims never went to hospitals and mostly depended on spiritual treatment only. A detail survey focusing the village areas is recommended to get reliable estimates of rabies in villages for control the rabies and better management of dog bite cases.

Key words: Rabies, Dog bite, Rawalpindi district, Questionnaire survey.

Introduction

Rabies is a disease of antiquity which was first described in 500 BC by the Greek philosopher Democritus.[1] Rabies is a viral disease of brain and central nervous system and globally 60,000 rabies deaths occur per year. Every year, more than 15 million people worldwide receive a post-exposure vaccination to prevent hundreds of thousands of rabies deaths.[2] Australia is said to be the only continent in the world where no incidence of rabies has been reported. Very few cases of rabies have been reported for the continents of Europe and America.[3]

Rabies is a neglected infectious disease in developing countries of Africa and Asia[4]. About 44% of rabies

deaths occurred in Africa and 56% in Asia[3]. All over the world, India placed first with more than 20,000 human rabies cases annually[5] and China at second position with 3200 human deaths[6]. Pakistan is third with reference to rabies deaths in world and reported 2490 deaths per annum.[7, 8]

Animals like bats, cats, mongooses, monkeys and foxes spread rabies but dogs are the main source of rabies in human (being 96% in Africa and 98% in Asia[4]). Moreover, dogs have a role in about 100 zoonotic diseases. They act as reservoirs of pathogenic infections[9] and cause diseases in humans, livestock and wildlife. Of these, rabies is the most dreaded of all these diseases[3, 10].

In Pakistan, most of the research deals with the occurrence of dog bites and post-exposure treatment guidelines.[11-17] It seems that no vaccination campaign has ever been carried out nor dog ecology and demography have ever been studied in Pakistan. There is no research published on dog population in Pakistan.[18]

Recently, the cases of dog bites are increasing in Pakistan. Only in Karachi city, 55-60 dog bites occur per day.[12] The incidence of rabies in Karachi has been estimated to be 9.6 persons per million[16] while country-wide, the death rate is 17 persons per million. [4, 12] Newspaper reports claim significant increase in the stray dog population in different cities of Pakistan. Three allied hospitals in Rawalpindi city and Tehsil Headquarters Hospitals in Rawalpindi district receive more than 100 dog bite cases every month and the number was continuously on the rise.[19-21]

In the above scenario, it is hypothesized that the number of dog bites and people suffered from rabies in Pakistan are underestimated. Therefore, an effort has been made to collect and collate information on incidence of rabies and dog bites from different types of human settlements, namely city, towns and villages. Moreover, data on dog bite from National Institute of Health (NIH) is also presented in this study.

Materials and Methods

A questionnaire based survey was carried out from May, 2010 to December, 2012 in randomly selected areas of Rawalpindi district.

Study areas

Rawalpindi district (33°.04'–34°.01' N and 72°.38'–73°.37' E) is spread over 5286km^2 of the northeastern part of the province of Punjab (Pakistan). The projected human population of Rawalpindi district in 1998 was 3.3 million with a density of 851.3 km^{-2}. Rawalpindi is the only city of Rawalpindi district. There are six towns, and 1165 villages in this district[22]. The present study is mainly focused on the municipal part of Rawalpindi city (because of security restrictions, it was not possible to move freely in the cantonment area); three towns and sixteen villages of the district (Figure 1). The city and the towns have been sub-divided into census charges, circles and blocks. In a block there may be 200 to 250 households, a circle may have 5 to 7 blocks, while there may be 5 to 7 circles in a charge[23].

Out of 91 city census circles, four (viz. 6/12, 4/18, 3/22 and 4/26) were selected randomly. There are six towns in Rawalpindi district, out of which three towns namely Taxila, Gujar Khan and Murree were selected for this study. Each of these towns respectively divided into 6, 17 and 9 census circles. Out of which, 2 (viz. 301/1130, 403/1130 of Taxila town), 3 (viz. 902/1210, 906/1210 and 007/1211 of Gujar Khan town) and 2 (viz. 301/1180 and 306/1180301 of Murree town) census circles were selected, respectively.

There are 1165 villages in Rawalpindi district. Sixteen of these villages belonging to five different tehsils were selected randomly for the questionnaire survey (Table 1; Figure 1).

Survey Procedure

A questionnaire was developed to obtain the requisite information on the dog bites and rabies of the study area. The questionnaire (which was in Urdu language) was pre-tested involving people living in rural and urban communities. After necessary amendments it was used in the field. A good number of people of each habitat, namely city, towns and villages were sampled using the returned-questionnaire.

The first portion of the questionnaire included the information about respondent's sex, age, education and the number of adult and juvenile male and female members lived in the household. The second portion of the questionnaire included the data on rabies and dog bites in the household. The questions asked during the survey were "Did someone die from rabies in an area and when, what was the vector of rabies? How many dogs rabid in an area and when, what was done with these rabid dogs? Any livestock of the respondent rabid; when and what was it (cows, buffaloes, goats, sheep, donkey etc)? Any household member was bitten by dogs and what kind of treatment given to them? Ever seen or heard the howling of jackal in the area?"

Table 1: Households of Rawalpindi district surveyed for the rabies deaths and dog bite cases.

Habitats	Census circle/ Village	Households surveyed	People lived in the households	No. people per household	Rabies death cases			Dog rabid			Dog bite a household member		
					NA*	No	Yes	NA	No	Yes	NA	No	Yes
Rawalpindi city	6/12	69	478	6.93	1	65	3	0	64	5	8	58	3
	4/18	51	357	7.00	2	49	0	2	49	0	0	51	0
	3/22	82	676	8.24	5	77	0	10	69	3	10	70	2
	4/26	82	571	6.96	0	82	0	9	67	6	7	73	2
	Total	284	2082	7.33	8	273	3	21	249	14	25	252	7
Taxila town	301/1130	26	191	7.35	0	20	6	0	12	14	0	18	8
	403/1130	34	270	7.94	0	23	11	0	6	28	0	23	11
Gujar Khan town	902/1210	32	233	7.28	0	20	12	0	17	15	1	21	10
	906/1210	47	311	6.62	2	35	10	4	20	23	2	33	12
	007/1211	29	237	8.17	0	23	6	0	5	24	0	20	9
Murree town	301/1180	16	114	7.13	0	12	4	0	12	4	2	10	4
	306/1180	56	391	6.98	0	50	6	1	31	24	0	48	8
	Total	240	1747	7.28	2	83	55	5	103	132	5	173	62
Villages	Choha Khalsa	73	517	7.08	3	61	9	2	29	42	3	55	15
	Islampura Jabbar	87	595	6.84	0	65	22	0	44	43	1	64	22
	Chak Beli Khan	104	765	7.36	1	88	15	0	52	52	3	78	23
	Ranial	98	731	7.46	3	72	23	1	45	52	4	69	25
	Maira Kalan	92	619	6.73	0	67	25	0	43	49	0	70	22
	Khinger Kalan	72	611	8.49	1	59	12	0	17	55	1	48	23
	Lakot	79	579	7.33	0	54	25	1	31	47	0	54	25
	Bagga Shiekha	72	540	7.50	0	59	13	0	27	45	0	46	26
	Angoori	72	598	8.31	0	60	12	0	20	52	0	47	25
	Panjgraan	85	676	7.95	1	60	24	0	21	64	1	51	33
	Ehata	70	480	6.86	0	49	21	0	27	43	0	47	23
	Samote	83	637	7.67	0	62	21	3	34	46	4	53	26
	Lohsar Sharfoo	87	662	7.61	0	70	17	1	33	53	3	60	24
	Narali	94	697	7.41	1	77	16	5	35	54	0	65	29
	Musiaari	83	565	6.81	0	60	23	1	37	45	0	60	23
	Jatli	85	625	7.35	1	64	20	0	18	67	0	59	26
	Total	1336	9897	7.41	11	1027	298	14	513	809	20	926	390
	All habitations	1860	13726	7.38	21	1483	356	40	865	955	50	1351	459

**NA = Not answered*

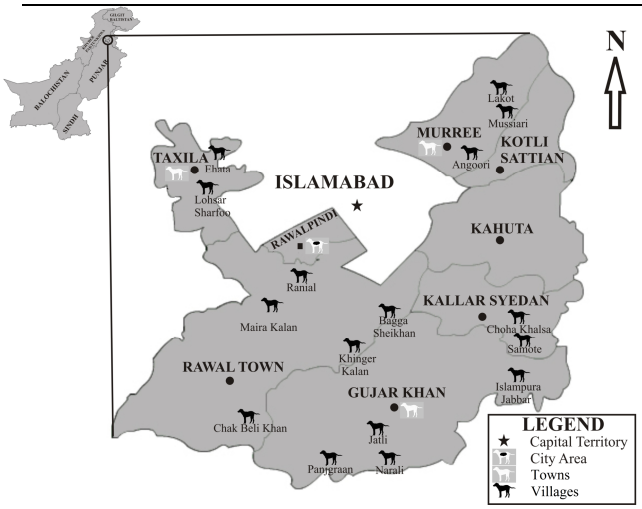

Figure 1. A map of Rawalpindi district showing selected study areas

Data on incidence of dog bites collected from NIH

National Institute of Health (NIH) is one of the largest health institute of Pakistan in which different vaccines and antivenin drugs are prepared and distributed throughout the country. The National Institute of Health (NIH) produces all of the anti-rabies SBV (Sheep brain vaccine) in Pakistan and was purchased by the provincial governments and provided free of cost to the general public.[12] In the region, it is only hospital specific with reference to rabies and dog bite treatment. That is why, this hospital was selected to collect data on incidence of dog bite in the area.

Results

From three human habitations, viz. Rawalpindi city, three towns and 16 villages, a total of 1860 questionnaires were received back from the respondents of the respective households. These households were populated with 13726 people (7.38 persons/household).

Rabies in human

Out of 1860 household, only 356 respondents reported the persons that died due to rabies (Table 1) in which 1% (3) belonged to Rawalpindi city, 15% (55) were inhabitant of the towns and 84% (298) were resident of villages. About 169 respondents reported rabies cases from 1939-1980, 94 from 1981-2001 and 93 from 2000-2012. Overall, respondents reported more number of rabies cases in the last decade. Majority (88.48% (315)) of these reported, dog as vector of rabies and 8.43% (30) jackal as cause of rabies in the persons while 2.8% (10) of respondents did not know about the vector of disease.

Rabies in dogs

Out of 1860 households, 955 (51.34%) reported 1285 dog rabid in their area. In this regard, 14 households of Rawalpindi city reported 13 dogs rabid, 132 town's households reported 185 rabid dogs, while 809 households of the villages reported 1087 rabid dogs in the area. Out of 1429 respondents, 1204 (84.25%) told that they tried to kill rabid dogs, 196 (13.72%) reported escape of rabid dogs while only 29 (2.03%) deliberately let the rabid dogs to go.

Rabies in livestock

Overall, 29.41% (547) respondents reported the deaths of livestock from rabies (1.76% from city, 27.92% of towns, and 35.55% of villages). Out of 547 livestock deaths, 5, 67, 475 were reported from city, towns and villages of district Rawalpindi, respectively. Furthermore, out of 547, 356 households reported 403 cow's deaths due to rabies (city (2), towns (47) and villages (354)); 147 households reported 159 buffaloes' deaths (city (2), towns (10) and villages (147)); 80 households reported 111 goats' deaths (city (3), towns (18) and villages (90)) while only 35 households reported donkey deaths due to rabies in their area (city (0), towns (7) and villages (57)).

Jackals in Area

About 72.15% (n=1342) of the respondents had heard howling of jackal in the area, while, 52.90% (984) of them also sighted a jackal directly. It was further recorded that out of 984 respondents, 145 (14.73%) were resident of the towns while 839 (85.26%) lived in village area. Jackal was never observed in the city area by respondents and only 4 (0.2%) of city people heard jackal's howling in an area at night. While 185 (13.78%) of town's respondent heard jackal howling. However, 1153 villagers (85.91%) heard howling of jackal in the night.

Dog bites and treatment

Of the 1860 households, 2.67% (n=459) respondents reported that, at least, one member of their family was bitten by a dog. Seven (1.52%) of these households were in the city, 62 (13.50%) were in towns, while 390 (84.97%) were in villages (Table 1). Further information about the bitten member of household was also collected except 10 miss cases (n=449 household) for which 15.14% (68) adult females bitten members, 47.66% (214) adult males, 10.91% (49) female children and 26.28% (118) male children.

After being bitten by dogs, 24% (111) of the victims sought spiritual treatment only, 40% (185) of the victims went to the hospitals for treatment, 25% (114) sought both hospital and spiritual treatments, while 11% (49) of the victims did nothing about treatment. It was most important to note that the number of people bitten (n=459) by dogs has increased from 4.79% (1964-1973), 8.06% (1974-1983), 5.88% (1984-1993), 17.21% (1994-2003) to 64.05% in 2004-2012. The questionnaire data revealed that the cases of dog bites had been increasing with the passage of time.

Incidence of dog bite in NIH

Number of dog bite cases reported in NIH is shown in Figure 2. About 4666 (666.57/year) dog bite cases were reported in NIH from 2005 to 2011. In 2005, the lowest number of cases were recorded (i.e. 313) and the highest number of dog bite cases were recorded in 2007 (i.e. 964). Majority of the patients was from nearby rural areas of Rawalpindi and Islamabad districts.

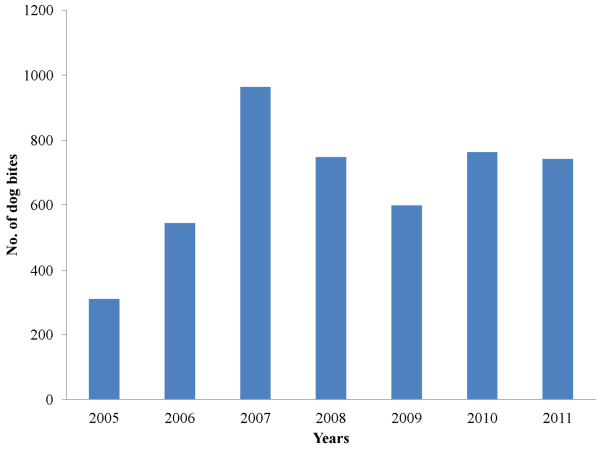

Figure 2. Incidence of dog bite during 2005-2010 reported in NIH, Islamabad Pakistan

Discussion

Sixty thousand human deaths from rabies occur globally each year, of which 20,000 take place in India[5] and China is at second position with 3200 human deaths[6]. While according to WHO reports[7,8] on rabies, the rabies deaths from Pakistan were 2490. However, our study showed an

increase of rabies death (7/year) in Rawalpindi district only. The human and canid populations of the villages are scattered in groups and separated but not isolated from each other. Our questionnaire aided study in three habitats (namely city, towns and villages) led to know that majority of villagers may suffer rabies deaths every year in Rawalpindi district. The villages of the study area are better populated with dogs (both stray and domestic dogs) than the towns and city.[24] Moreover, it might be very useful to conduct an interview survey which focused on the villages (from where rabies death cases are reported during this study) to estimate the exact number of rabies victim in the district as the village people are somewhat different from their urban counter parts. In the closely knit societies of village, people have relatively strong social bond with each other and take interest in each other's pleasures and sorrows. So, the village people are expected to remember their unfortunate fellows, who fall to a dreaded disease like rabies.

Moreover, the jackal sighting in the village habitat is very frequent as compared to towns and city. During the survey, about 8.43% respondents reported rabies deaths by jackals. The dog populations especially those of the villages come in frequently contact with jackals (*Canis aureus*), mongooses (*Herpestes javanicus*, *Herpestes edwardsii*), foxes (*Vulpes vulpes pusilla*, *Vulpes bengalensis*) and jungle cat (*Felis chaus*)[25]. All these species are vectors of rabies and other diseases of humans and livestock. That is why, the number of rabid dogs in the villages was very high. Our study confirmed the Newspaper reports that claimed the continuously rise of dog biting[19-21] and it was further revealed that majority of people bitten by dogs were inhabitant of village areas. However, 666.57 dog bites per year reported by NIH are underestimated because NIH is not covering whole areas of Rawalpindi and Islamabad districts. Furthermore, 35% of the victims do not visit hospitals for treatment. Male bias dog biting was due to the fact that in our society mostly males deal with pet dogs (like leashing or unleashing of the dogs) and they work outside the home more frequently than female counterpart. Therefore, they are more exposed to pet or stray dogs as compared to female.

Overall, it is alarming situation in the country and required immediate plan to control the rabies and dog bite cases in the area. A rabies disease survey focused on the village area should be carried out along with vaccination campaign of pet dogs as large numbers of people are suffering from rabies and bitten by dogs in the rural areas. Furthermore, still a good number (24%) of victims went for spiritual treatment or local medicine men. Therefore, awareness programs for the villagers should be started as soon as possible.

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Conclusion

Number of rabies victims increased in the last decade and village people are more suffered from rabies as compared to city or town people. The questionnaire data revealed that dog bite cases increased in an area and dog bite cases recorded in NIH per year are underestimated as 35% of victims never went to hospitals and mostly depends on spiritual treatment only. A detail survey focusing the village area is recommended so that a policy is made to control the rabies and dog bite cases.

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