Short Communication

Analysis of Reported Dog Bite Data in Government Hospitals of Various Districts in Punjab, Pakistan

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Abstract

Background: Rabies is a neglected and underestimated national public health issue in Pakistan. Free-roaming dogs are the principal reservoir and also potentially cause thousands of dog bite injuries in different age groups of people.

Objectives: The present study was designed to evaluate the burden and frequency distribution of total dog bite injuries in Punjab. The comparison of total dog bite injuries between 2019 and 2020 were made to understand whether there is significant difference in total number of dog bite injuries in 2019 and 2020.

Methods: Total dog bite data from public sector hospitals of Punjab province were collected for the time period between January 2019 to December 2020 with the help of District Health Information System (DHIS) which is a comprehensively designed digital program. Descriptive measures and the graphical representation were used to describe and interpret the said data. A non-parametric test (Mann-Whitney test) was used to compare the median number of dog bite injuries in 2019 to 2020.

Results: Results show that more than 0.2 million number of dog bite injuries have been recorded in 2019 and 2020. The medium number of the dog bite injuries in 2019 and 2020 were statistically significant, having p-value <0.05 using Mann-Whitney test. Furthermore, the median number of dog bite reported in Primary and Secondary Health Care Departments (PSHCDs) and Teaching Hospitals (THs) were not statistically significant in 2019 and 2020.

Conclusion: Based on the analysis of dog bite injuries in government hospitals, the number of dog bite injuries are perhaps increasing in the country due to lack of understandings regarding responsible dog ownership and interactive behavior of free-roaming dogs towards humans. Moreover, contact tracing of dog bite cases are also not performed routinely.

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Introduction:

Rabies is a vaccine preventable viral disease of neglected, underestimated and major public health concern in the developing countries of Africa and Asia, especially in Pakistan.[1] Globally 60,000 and over 31,000 people die of rabies in Asia every year[2]. One person dies of rabies every 15 minutes while 4 out of 10 deaths

(40% of total deaths) are in children under 15 years.[2] Almost 99% of rabies cases are due to the bite of free-roaming dog in the developing countries.[1] Dog is the principal reservoir for these bites, and considered to be the carrier of the rabies virus (RABV), and transmit to the domestic animals or humans through bite. The RABV produces severe and terrifying neurological symptoms in animals and humans.[1,3]

In Pakistan, thousands of dog bite injuries are annually reported in various species of animals (small and large animals) and all age group of human population (kids, teenagers, and adults) in public and private sector veterinary and human health centers.[1,4-5] Hence, the resulting dog bite injuries pose tremendous susceptibility in causing dog-mediated rabies to humans as well as food animals in peri urban and urban areas[1]. This estimate is in no way near accurate because rabies is not a reportable disease in medical sector of Pakistan and lacks of integrated surveillance system also devalues the accuracy of the data.[1,6]

Primary and Secondary Health Care Departments (PSHCDs) include all the public sector hospitals and dispensaries that entertain the patients at outdoor patient departments, while Teaching Hospitals (THs) are affiliated with the medical colleges of the Punjab to train medical graduates in medical field and practice[7]. The PSHCDs and THs are the leading health care facilities to cure the medically ill patients including the human victims bitten by the dogs, and the said dog bite data are stored in the District Health Information System (DHIS) for record keeping, budgetary assessments, and overall assessment.[8] On daily basis, 50 to 60 animal bite cases are recorded in these health units.[9] Unfortunately, most of the remote cases are not even reported to PSHCDs or THs, while some of the left-over dog bite injuries are handled manually by the quakes using their weird and superstitious methods.[9,10] About 9 people out of one million have been suffering from rabies only in Karachi.[11] The present study was planned to assess the provincial burden of dog bite injuries and interpret the frequency distribution of these dog bite injuries which will help us to find out relative burden of reported dog bite injuries and how these injuries could possibly lead to potential risk of rabies in different age groups of people.

Methods:

As the DHIS is digital software, and a part of the Health Information System (HIS) or the national surveillance system of Pakistan, it manages the disease related data indicators to analyse, assess, report, and evaluate the evidence-based decision making. The government of Pakistan has been using the DHIS software to maintain the record of medical injuries, communicable and non-communicable human diseases since 2009. The dog bite injuries are recorded in these PSHCDs and THs which are then auto-assembled in the predesigned table shells of DHIS software.[7] The whole data of diseases including the dog bite injuries are then transmitted to provincial data set for the final evaluation and decision making (Fig. 1). The reported dog bite data of 2019 and 2020 were acquired from DHIS.
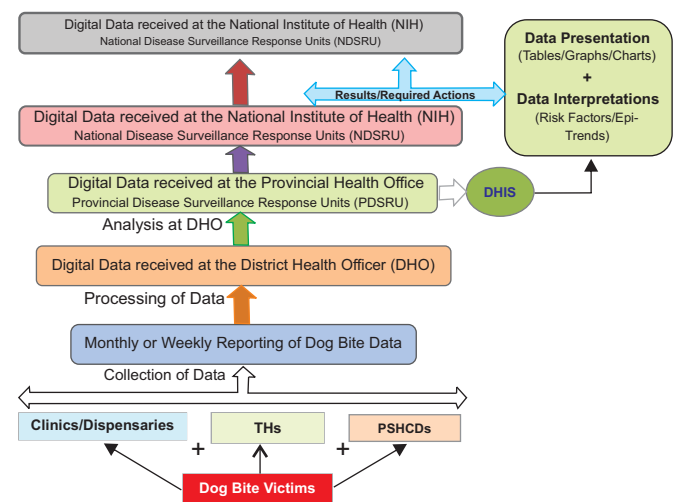

Fig. 1: *The diagram showing the flow of data information in DHIS*

It is a descriptive epidemiological study that obtained the prevalence record of the total dog bite injuries in 2019 and 2020. Only the human-dog bite injuries were included in this data while other medical injuries (road accidents, gunshot wounds, fractures) were excluded. Moreover, each district was screened to obtain the needful data regarding the number of dog bite cases, while incomplete or partial data from any district were excluded from the study.

Statistical analysis was performed using the Statistical Packages for Social Sciences (SPSS) v.25.0 (SPSS, Inc., Chicago, IL, USA). Numerical data were described in terms of mean, standard deviation, minimum and maximum values to observe the average number of dog bite

Table 2: *Prevalence of dog bite case in Punjab for the year 2019 and 2020*

City Name	Year 2019	Year 2020	City Name	Year 2019	Year 2020
Attock	2.18	1.98	Lodhran	2.29	2.1
Bahawal-nagar	1.31	1.46	Mandi Bahauddin	1.5	0.91
Bahawalpur	3.76	2.46	Mainwali	7.29	4.14
Bhakkar	4.77	4.61	Multan	4.22	2.83
Chakwal	1.55	1.71	Muzaffargarh	2.46	3.01
Chiniot	1.79	1.72	Nankana sahab	0.72	1.35
D.G khan	5.62	5.72	Narowal	1.93	2.39
Faisalabad	6.23	5.91	Okara	3.33	4.01
Gujranwala	2.85	2.63	Pakpatan	1.78	1.69
Gujrat	1.27	1.32	Rahimyar khan	5.6	6.24
Hafizabad	0.95	0.82	Rajanpur	3.27	2.87
Jhang	2.21	2.73	Rawalpindi	2.02	3.35
Jhelum	0.99	1.03	Sahiwal	3.6	2.57
Kasur	2.89	4.56	Sargodha	3.18	3.18
Khanewal	2.46	2.74	Sheikhupura	4.97	4.49
Khushab	1.31	1.43	Sialkot	1.78	1.79
Lahore	1.73	2.23	Toba Tek singh	1.85	2.87
Layyah	1.03	1.96	Vehari	3.32	3.18

Table 1: *Descriptive statistics for dog bite injuries in 2019 and 2020 of Punjab-Pakistan.*

Years	Mean	Standard deviation	Minimum	Maximum
2019	6,304	3,695.63	1630	16555
2020	7,347	3,711.45	2175	16516

mean, the minimum and the maximum number of dog bite cases in 2019 and 2020. Mann-whitney test was used to compare the number of dog bite injuries between PSCHDs and THS in 2019 and 2020 seperately. The variables were found significant having p-value <0.05. Furthermore, the same test was also used to compare the total number of dog bite injuries in 2019 and 2020 among different districts of Punjab.
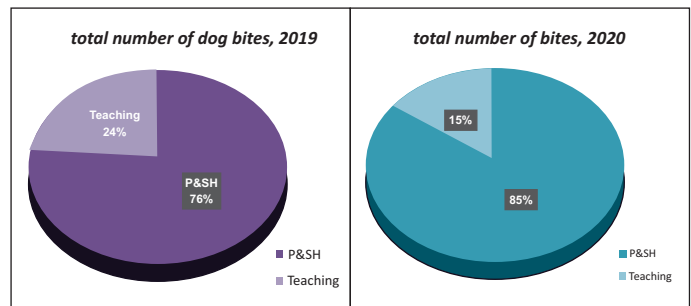

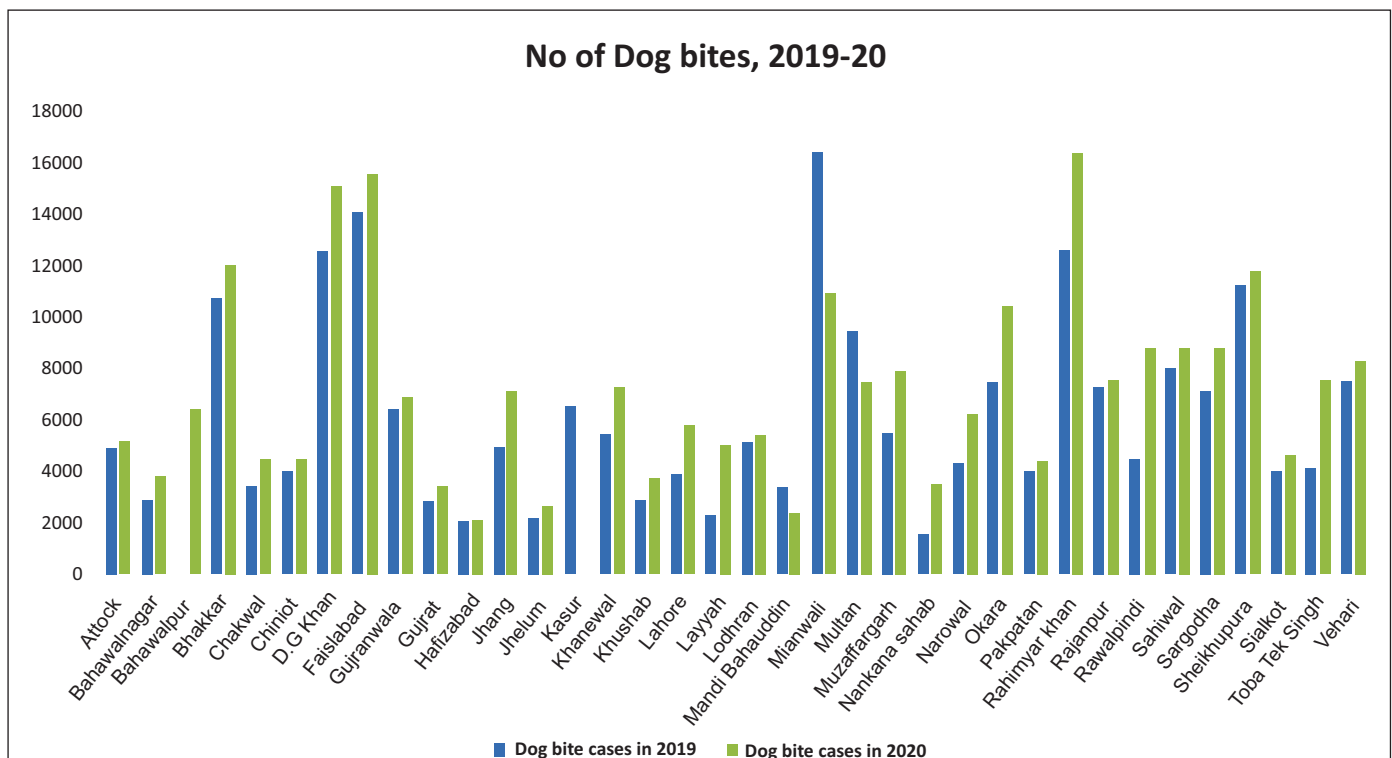**Fig. 03:** *Total number of dog bite injuries reported at PSHCDs and THs in 2019 and 2020.*

Fig. 2: *Graph of the total number of dog bite injuries in different districts of Punjab during 2019-2020.*

injuries, dispersion of the dog bite injuries around the

Results:

The descriptive statistics for total number of dog bite injuries in different districts of Punjab show the minimum and maximum number of bite injuries (Fig. 2). It is important to mention that PSHCDs are widely spread in different localities of urban and rural areas of different districts, therefore, many people have the access and availability to get remedial measures to treat their dog bite wounds. This is the reason that the average totality of patients visiting PSHCDs are more in number compared to the THs which are only affiliated with the medical colleges (Fig. 3). The average numbers of the available and reported dog bite for the year 2019 and 2020 were 6304 and 7347 in all the districts. Similarly, the maximum number of dog bite injuries were 16555 and 16516 for the year 2019 and 2020, respectively. The minimum number of dog bite injuries in 2019-2020 were 1630 and 2175 respectively (Table 1 & Table 2). The results reported in Table-1 are for year wise data (2019 and 2020) as a sum of a total number of dog bite cases is reported for each district. For example, a total of 4958 dog bite cases have been reported in district Attock in 2019.

The p-values of Mann-whitney test for comparing the median number of dog bite cases in THs and PSHCDs for 2019 and 2020 are 0.0499 and 0.1823 respectively. These are the p-values for median number of dog bite cases in PSHCDs and THs in different districts of Punjab. These results show that the median number of dog bite injuries differs significantly in PSHCDs and THs for 2019 as p-value is <0.05. Moreover, the p-value of Mann-whitney test for comparing median number of dog bite injuries in PSHCDs and THs does not vary significantly for the year 2020. The p-value for comparing median number of overall dog bite injuries during the year 2019 and 2020 is 0.0009 (< 0.05) which indicates that the medain number of dog bite injuries are statistically significant. It is important to mention here that we compared the number of dog bite injuries in all district of Punjab in 2019 and 2020. The number of dog bite injuries in PSHCDs and THs in different districts of Punjab for the year 2019 and 2020 were also observed. As we have two types of institutions (PSHCDs and THs) in different districts, therefore, the total number of reported dog bite cases in both categories of institutions were logically compared.

Discussion:

To our knowledge, this is the first study that has shown the overall situation of dog bite injuries in various hospitals of Punjab, Pakistan. The country is categorized among Southeast Asian states as highly endemic with dog-mediated human rabies with an approximate death tool of 2000 to 5000 annually.[12] The dog bite injuries reported in present study are high due to abundant population of free-roaming dogs in urban and rural settings of each district which pose great concern to the pedestrians.[3,9] Similar retrospective studies have been conducted to determine existing burden of dog bite injuries, availability, and cost of prophylaxis in many hospitals of Karachi, Faisalabad, Lahore, and other cities of Punjab.[8,12,13] Moreover, the lack of responsible pet ownership or means to interact with the free-roaming dogs are also not well aware by the public that provoke aggression and anger among these dogs.[4-6] The ecological niches and densities of free-roaming dogs in various geographical settings of Pakistan have also been not explored that allow free breeding to produce further numbers of ownerless dogs in Pakistan.[1,6,9]

It is unlucky that the reported dog bite injuries of each district are not the sum of all the injuries, instead these are the numbers of all those patients who have access to these health care facilities[1]. Credible studies claim that all the dog bite injuries are not even reported in hospitals.[6,9] Another issue is the limited number of government owned or accessible health care services for the dog bite victims1. There is even no systematic vaccination record or proportions of pet or unowned dogs in various districts which is a continuous risk posed by these unvaccinated dogs.[9,11] In addition, research studies have not been previously conducted to determine risk factors and contextual justifications behind such huge number of dog bite injuries that would help to recommend and design dog vaccination, outreach programs, and awareness activities to combat dog-mediated rabies in high-risk areas of Punjab, Pakistan.[1,3,6,8]

In terms of control and preventive strategies of dog bite injuries and rabies, One Health approach is highly needed in Pakistan which is also direly deficient due to limited coordination and data exchange among veterinary, medical, and environmental sectors.[1,2] Legislative negligence, lack of disease prioritization, and budgetary preferences have worsened this public health problem

in Pakistan.[1,4,5]

In Pakistan, the diagnostic surveillance system in each district, mandatory dog vaccination, and integrated bite control management are the tools to combat the ever-increasing cases of dog bite injuries and rabies in animals and humans.[1,3,12] It will facilitate reporting and tracing mechanism among animal, medical, academia, and district administrative sectors using One Health approach.[2] In this regard, the Government of the Punjab, Pakistan has already sanctioned limited budget to vaccinate the free-roaming dogs using One Health approach. Similar tools and approaches have been adopted in adjacent Asian and African countries where impact of these activities is long lasting and those countries are moving to achieve '0 by30' vision of dog-mediated rabies elimination set by the quadripartite.[3]

Due to certain missing indicators in DHIS software, the baseline data indicating the ratio of male and females were not available. Moreover, the time of injury, demographic features of the victims, and body part being inflicted were also not obtainable to analyse the numerical data more precisely. In addition, the information regarding the categories of the wounds, and types of dogs (pet or ownerless, male or female) involved in the incident were also unfortunately not obtained.

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