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Original Research Article

Compliance of anti-rabies vaccine among dog bite victims in an urban slum of Chennai: a cross sectional study

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ABSTRACT

Background: Among infectious disease, rabies has the highest case fatality rate. The major problem of rabies is attributable to its dog-mediated transmission which is an impending threat to more than 3.3 billion people. Poor compliance of vaccine increases the mortality rate due to rabies. The present study attempts to ascertain pattern of dog bite and compliance to post exposure prophylaxis.
Methods: This cross sectional study was carried out in Primary Health Centre in an urban slum of Chennai in Tamil Nadu. The study included 301 dog bite victims residing in urban slum with wound categories II & III (as per WHO). A pretested, semi-structured questionnaire was used for data collection. Data was analysed with SPSS-IBM (version 21.0). Chi-square test was applied.
Results: Mean (SD) age of study participants was 28 (±16.3) years. Males were 176 (58.5%) and females were 125 (41.5%). Among the bites, pet dog bites were 140 (46.5%), and stray dog bites were 161 (53.5%). Majority of the bites 161 (53.5%) were unprovoked, category II bites were 216 (28.2%).Compliance up to 3 dose was found in 213 (70.8%). Association was found between site of the dog bite and compliance of anti- rabies vaccine (p=0.021).
Conclusions: Despite the availability of costless vaccines in public health care system, the compliance rate is only moderate. Health education about the vaccination after dog bite needs to be imparted among the community to reduce the rabies related mortality rate.

Keywords: Rabies, Anti-rabies clinic, Compliance to anti-rabies vaccine

INTRODUCTION

Among infectious diseases, Rabies has the highest case fatality rate.[1] The major burden of rabies is attributable to dog-mediated transmission of rabies, threat more than 3.3 billion people.[2] Globally 26,400 – 61,000 deaths occur due to rabies every year of which 95% are due to dog bite. Amongst most developing countries, Rabies prevalence is noted more among the poor and vulnerable population and is rarely reported and notified.

To overcome the burden of disease and management, the World Health Organization (WHO) recommended wound categorization primarily for undelayed care.[1] In addition to wound categorization and wound management, anti-rabies vaccine is required for incapacitating the virus. The intramuscular anti-rabies vaccine consists of 'Essen' regimen - one dose 0, 3, 7, 14 and 28 days and 'Zagreb' regimen 0, 7 and 21 days in which two doses are administered on the first day and one dose on other days. In India, since 2006, intradermal anti rabies vaccine has been implemented with updated Thai Red Cross regimen which consists of vaccine on 0, 3, 7 and 28 days.[1]

A crucial step to curb this disease is adhering to regimen dates and completing the post exposure prophylaxis vaccines. Poor compliance of vaccine leads to mortality due to rabies disease. Therefore, the present study

attempts to ascertain pattern of dog bite and compliance to post exposure prophylaxis.

Objectives

1. To study the pattern of dog bites among urban slum population.
2. To measure the compliance of anti-rabies vaccine regimen among dog bite victims.

METHODS

This cross sectional study was carried out in Primary Health Center (PHC) located near Semmancherry urban slum, which is an urban field practice area of Chettinad Hospital and Research Institute (CHRI). Data collection period was from May 2016 to April 2017. The study included patients who were permanent residents of the urban slum attending anti rabies clinic of PHC. Dog bite victims with wound category II & III (as per WHO) were included in the study (Table 1).

Table 1: Categories of contact with suspect rabid animal and recommended prophylaxis.[1]

Categories	
Category I	Touching or feeding animals, licks on intact skin. No post-exposure prophylaxis is required.
Category II	Nibbling of uncovered skin, minor scratches or abrasions without bleeding. Vaccine should be administered.
Category III	Single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats. Vaccine and Immunoglobulin should be administered

The study excluded persons who received 1st two doses of ARV in any other hospital. Based on previous studies done in a similar urban setting, the compliance of ARV was found to be 76.5%.[3] This compliance rate was used for sample size calculation and the total sample size was 301. A pretested, semi-structured questionnaire was used for data collection. The post exposure prophylaxis was given to dog bite victims as per Thai Red Cross (TRC) regimen. A dose of 0.1ml in 2 sites intradermally on days 0, 3, 7, and 28. Victims who missed or discontinued 2nd, 3rd and 4th dose were considered as non - compliance victims (excluding the person who discontinued vaccine after 3 dose and the bitten dog was alive and healthy for 10 days after bite).[1] Victims who did not come to ARV clinic for subsequent dose were visited at their homes and checked for compliance. Approval from Institutional Ethical Committee was obtained. Data was analyzed using SPSS-IBM (Statistical Package for Social Sciences - International Business Machines Corporation) version 21.0 software. Proportions and mean were calculated. Chi – square test was used to determine association between categorical variables. P value of less than 0.05 was considered significant.

RESULTS

Among the study participants, the mean age was 28 years (±16.3). Males were 176 (58.5%) and females were 125 (41.5%). The ratio between male to female was 1.4:1. With regard to religion, 266 (88.4%) participants were Hindus, 12 (4%) were Muslims. Forty nine study participants (16.3%) were illiterates. According to BG Prasad Socio-economic scale, majority 147 (48.80%) were in lower middle class, only few participants belonged to lower class 18 (6%) and upper class were 8 (2.70%) (Table 2).

Table 2: Socio demographic profile of study participants.

Socio demographic variables	Frequency (n=301)	Percentage (%)
Age in years		
1-14	76	25.2
15-30	102	33.9
31-45	71	23.6
46-60	41	13.6
>61	11	3.7
Gender		
Male	176	58.5
Female	125	41.5
Religion		
Hindu	266	88.4
Christian	23	7.6
Muslim	12	4
Type of family		
Nuclear	260	86.4
Joint	41	13.6
Educational qualification		
Illiterate	49	16.3
Primary school	58	19.3
Middle school	71	23.6
High school	64	21.3
Higher secondary	29	9
Graduate	30	10
Socio-economic status*		
Upper class	8	2.7
Upper middle class	42	14
Middle class	86	28.6
Lower middle class	147	48.8
Lower class	18	6

*Modified BG Prasad classification- 2017 (CPI = 278).

Among the participants, 228 (75.7%) received second dose of ARV, 213 (70.8%) received third dose of ARV and 166 (55.1%) completed till fourth dose (Table 3).

Majority 56 (41.4%) reported that the reason for not receiving ARV dose was loss of wages due to work absenteeism. In our study population, all those who

missed the fourth dose were aware that the dog was alive after 10 days and thus skipping the fourth dose. Hence, the overall compliance of anti - rabies vaccine in our study was 70.8% (Table 4).

Table 3: Compliance of ARV among study participants (n=301).

Number of doses received	Frequency (n=301)	Percentage (%)
First dose	301	100
Second dose	228	75.7
Third dose	213	70.8
Fourth dose	166	55.1

Table 4: Reasons for missing ARV dose as per schedule (n=135).

Reasons for missing ARV dose	Frequency (n=135)	Percentage (%)
Loss of wages (work absenteeism)	56	41.4
Forgotten dates	48	35.6
Interferes with school timing(children)	31	23
Total	135	100

212 (99.5%) knew the status of bitten dog and 1 (0.5%) didn't know the status of the dog among those who were compliant ($\chi 2$ =8.660, p=0.003). The proportion of participants who knew the status of bitten dog was higher in compliant group than Non-compliant. Among the compliant participants, 24 (11.3%) were bitten in the head & neck 50 (23.5%) were bitten in the upper body, 136 (63.8%) were bitten in the lower limb, 3(1.3%) had been bit in the multiple sites of the body (χ^2=9.714, p=0.021). Among the participants who were compliant, 98 (46%) were bitten by stray dogs, 115 (54%) were bitten by pet dogs (χ^2=0.074, p=0.786). Among those who were compliant with the ARI regimen, immunization status of the dog were known in 99 (46.5%) and not known in 114 (53.5%) (χ^2 =1.553, p=0.213). There was no association between categorization of the wound and compliance of ARV. ($\chi 2$ =1.364, p=0.243) (Table 5).

Among the participants who were compliant, 70 (32.9%) were children and 143 (67.1%) were adults. The association between compliance of ARV and age was not statistically significant ($\chi 2$=1.815, p=0.178). There was no association between compliance of ARV and socio demographic factors like gender, religion, type of family, education, socio-economic status (Table 6).

Table 5: Association between pattern of dog bite and compliance of ARV (n=301).

Variables	Compliant N (%)	Non-compliant N (%)	Total	P value
Type of bitten dog				
Stray dog	98 (46)	42 (47.7)	140	0.786
Pet dog	115 (54)	46 (52.3)	161	
Immunization status of dog				
Know	99 (46.5)	34 (38.6)	133	0.213
Don't know	114 (53.5)	54 (61.4)	168	
Status of the dog after 10 days				
Known	212 (99.5)	83 (94.3)	295	0.003
Unknown	1 (0.5)	5 (5.7)	6	
Circumstance of bite				
Provoked bite	104 (48.8)	36 (40.9)	140	0.210
Unprovoked bite	109 (51.2)	52 (59.1)	161	
Site of dog bite				
Lower body	136 (63.8)	56 (63.6)	192	0.021
Upper body	50 (23.5)	30 (34.1)	80	
Head & neck	24 (11.3)	2 (2.3)	26	
Multiple sites	3 (1.4)	0	3	
Categorization of the wound				
Category II	157 (73.7)	59 (67)	216	0.243
Category III	56 (26.3)	29 (33)	85	
Timing of bite				
Day (6 am to 6 pm)	119 (55.9)	53 (60.2)	172	0.487
Night(6 pm to 6 am)	94 (44.1)	35 (39.8)	129	

Table 6: Association of compliance of ARV with socio demographic profile (n=301).

Variable	Compliant N (%)	Non-compliant N (%)	Total	P value
Age				
Children	70 (32.9)	22 (25)	92	0.178
Adult(≥18 years)	143 (67.1)	66 (75)	209	
Gender				
Male	130 (61)	46 (52.3)	176	0.161
Female	83 (39)	42 (47.7)	125	
Religion				
Hindu	185 (69.5%)	81 (30.5%)	266	0.421
Christian	18 (78.3%)	5 (21.7%)	23	
Muslim	10 (83.3%)	2 (16.7%)	12	
Type of family				
Nuclear	185 (86.9)	75 (85.2)	260	0.708
Joint	28 (13.1)	13 (14.8)	41	
Education				
Literate	182 (85.4)	70 (79.5)	252	0.207
Illiterate	31 (14.6)	18 (20.5)	49	
Socioeconomic status				
Higher SES*	99 (46.5)	37 (42)	136	0.482
Lower SES**	114 (53.5)	51 (58)	165	

*Higher SES- Class I, Class II and Class III,** Lower SES- class IV and class V (According to BG Prasad).

DISCUSSION

In the present study 75.7% received second dose of ARV, 70.8% completed third dose of anti - rabies vaccine and 55.1% completed the fourth dose. A study on compliance of ARV by Vinay et al reported that 59.8% received all 4 doses.[4] Our study finding were comparable with study conducted by Malkar et al which reported 42.81% of their participants completed the schedule.[5] The highest dropout of 4th dose were seen in all the studies, including our study.

In current study population, 25.9% second dose of ARV, 3.3% of them missed third dose, 15.7% of the participants missed the fourth dose of ARV. These observation were comparable with study conducted by Malkar et al which reported that 82.97% received second dose of ARV, 70.7% received three dose of anti-rabies vaccine, 46.17% completed four dose of anti-rabies vaccine.[5]

In the present study, 46.5% were bitten by stray dog. Most of the participants (55.80%), were not aware of immunization status of the biting dog.18.90% of the bitten dog were immunized. This finding was comparable with the study done by Bharathy et al in Chennai which reported that 47% were bitten by stray dog.[6] Another study by Seenivasan et al reported that 21.4% of the dog were immunized.[7] We observed in our study that 46.50% of the bites happened were due to provocation. In a previous study by Trivedi et al 24.1% of the bite happened in provoked circumstance.[8]

Lower limbs were more commonly bitten by dog (63.80%) as it is the most accessible part of the body for the dogs. Similarly, Ghosh et al showed that 62.69% of the bitten sites were in the limbs.[9] Dompale et al observed that 53.8% of the site of bite marks in the lower limbs. In our study category II dog bite were higher.[3] Contrary to this finding category III cases reported were 89.4% by Trivedi et al and 71.50% by Patel et al.[10,11]

In this study, the most common place of dog bite was in the streets (33.6%) and 42.9% the bite happened at night time. This may be due to inadequate illumination. A study by Marathe et al showed 51.5% of the bite occurred in streets and 11.4% occurred during night.[12] Dog related factors viz. fate of the dog and site of dog bite were associated with compliance of ARV. These findings were similar to study conducted by Malkar et al.[5]

In the present study, dog bite was observed in all the age group with children being more vulnerable (30.5%). Ghosh et al and Shah et al found that 16.13% and 25.2% of the more susceptible to dog bites were found in children.[13,14] Males were found to be higher because of their mobility due to occupation. Bharathy et al and Marathe et al also described that males were more commonly affected than female.[6,12]

In the present study were 16.3% were illiterate. These findings are comparable with the study conducted by Seenivasan et al in which 18.3% were illiterate and Chinnaian et al reported 14.9% illiterates.[15,16] Majority (48.80%) belonged to lower middle class, 28.60% were in middle class followed by 14% were in upper middle class, 6% in lower class and 2.70% in upper class. This distribution of socio-economic status is comparable with

previous studies by Anandaraj et al in Karnataka where 33.3%were in lower middle class, 31.3% were in middle class.[14]

CONCLUSION

Compliance of ARV in our study was 70.1%. The major reason of poor compliance among victims was lack of awareness. Children were affected more. Night time (6 pm to 6 am) was more common time for bitten because of inadequate illumination. Health education about the vaccination after dog bite needs to be imparted among the community to improve the compliance rates.

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