

Anti-Rabies Vaccination: Hidden losses due to incomplete vaccination, a Retrospective study conducted at tertiary care hospital of Mumbai, India



Clinical Research
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ABSTRACT In India each case required a mean of 4.4 visits for PEP, at a cost of at least \$50 and a loss of 2.2 days of work. The aim was to estimate the resources of hospital and man days wasted of patients because of defaulting the vaccination. It was a retrospective study conducted at tertiary centre, data of one year regarding vaccine route and doses received, type of syringes used etc. of 587 dropouts recorded. Mean 2.25 hospital visits, 1.1 work/school days of dropouts and 10 weeks work of ARV OPD staff wasted due defaulting the process. The average expenditure done to vaccinate one dropout patient was ` 1,453 (US\$ 21.41). India is spending more than 10 Million US\$ on Anti Rabies vaccination dropouts which is almost 1/10th cost of Anti Rabies Vaccination. Being lower middle income country and endemic for Rabies any wasteful resources is a relatively a serious concern.

Introduction: Rabies is a vaccine preventable viral disease which occurs in more than 150 countries and territories¹. To prevent human from Rabies almost 563 million US dollars are spent annually in the world². The disease still an important public health problem in south-eastern Asia and an estimated 45% of all deaths from rabies occur in that part of the world³. The situation is especially pronounced in India, which reports about 18 000 to 20 000 cases of rabies a year and about 36% of the world's deaths from the disease⁴. India has approximately 25 million dogs, with an estimated dog: man ratio of 1:36.2⁵. In India, about 15 million people are bitten by animals, mostly dogs, every year and need postexposure prophylaxis. Each case required a mean of 4.4 visits for treatment, at a cost of at least \$50 (for the vaccine and other medicines) and a loss of 2.2 days of work⁶.

Intradermal vaccination, recommended by the World Health Organization in low resource settings. Sometimes patients are advised to watch the offending animal for abnormal behaviour for 10 days after a bite before seeking prophylactic treatment, but because animals can be asymptomatic carriers, such delay can be risky. It would be safer to administer the complete course of Anti Rabies Vaccination to anyone who gets bitten by an animal^{7,8}. Rabies incidence in India has been constant for a decade, without any obvious declining trend, and reported incidence is probably an underestimation of true incidence because in India rabies is still not a notifiable disease⁹.

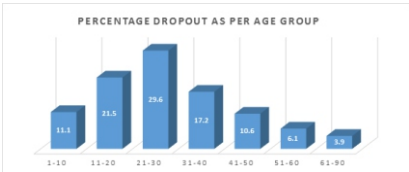
The prophylaxis against Rabies needs multiple doses of vaccine for complete immunity. It has been observed that some patients did not complete the complete prophylaxis. The rationale behind the current study is to determine the resources wasted because of defaulting the vaccination process and it is also obvious that patient has visited to hospital which has taken almost one day per visit. The specific aim and objectives of study is to estimate the resources of hospital and man days of patients wasted because of defaulting the vaccination schedule.

Subjects and Methods: This is a retrospective hospital record based study conducted at Grant Government Medical College & Sir J.J. Group of Hospitals Mumbai India after obtaining Institutional Ethical Committee permission. Patients seeking treatment for Pre and Post Exposure Prophylaxis for animal bite takes treatment from Anti Rabies Vaccination (ARV) OPD. Detail history of animal bite gets recorded in tabular form in master register of ARV OPD. All category II and III exposure assessed as carrying a risk of developing rabies requires PEP. For vaccination purpose Intramuscular and Intradermal regimen are recommended by WHO. In Intramuscular regimen one dose (1 ml) of the vaccine administered on days 0, 3, 7, 14 and 28 and in Intradermal regimen two doses (0.1 ml each) of the vaccines administered on days 0, 3, 7 and 28 of animal bite. As per the study

criteria the data regarding demographic profile of patients, Category of animal bite, animal behaviour whether provoked or unprovoked bite, stray or pet animal, vaccine route and doses received for prophylaxis, type of syringes used etc. recorded from 1/04/2014 to 31/03/2015 from master register of ARV OPD of only those patients who have defaulted there vaccination schedule. Being a tertiary care centre, many patients from different part of Mumbai come to Grant Government Medical College & Hospital Mumbai for vaccination, after getting their address they are advised to take remaining doses of vaccination from their nearby health facility. So in this study only those patients are enrolled who were advised to take treatment from this centre. Total 587 such patients were identified from master register.

Results: Total 2844 patients were registered for vaccination from 1/04/2016 to 31/03/2015. Dropout for a year was 587 i.e. 20.64%. One third (32.6%) dropout were less than 20 years of age.

Figure 1: Age Group wise dropout patients



Total 587 patients had visited 1324 times to hospital for Anti Rabies Vaccination. Each dropout case required mean 2.25 visits to hospital and 1.1 work days/school days wasted due defaulting the process. To vaccinate these 587 individuals 304 vials of Vaccine and 1324 syringes (1 ml Syringe for Intradermal injection and 2 ml syringe with needle for Intramuscular injection) were required which cost for `1,02,871 (US\$ 1515.82). The monthly overhead cost to vaccinate animal bite patients is (including anti rabies OPD staff salaries and administrative cost) almost `3,00,000. The monthly average ARV OPD at Grant Government Medical College for year 2014-15 was 237, So by considering the average monthly ARV OPD, almost `7,50,000 (US\$ 11,051) administrative expenditure done to vaccinate these 587 dropout patients and almost 10 weeks work of ARV OPD staff has wasted. So for year 2014-15 `8,52,871 (US\$ 12,567) wasted because of defaulting the vaccination schedule. The average expenditure (Including vaccine, logistic, administrative cost and staff salaries) done to vaccinate one dropout patient was `1,453 (US\$ 21.41).

Table 2: Calculation of expenditure for Vaccination

	Vaccine and Logistic used	Vaccine and logistic cost*	Work of ARV OPD staff	Staff salary & administrative cost#	Total	School/Man days wasted
Total 587 Dropout patients	304 ARV vials and 1324 syringes (1275ID, 49IM)	`1,02,871 (US\$1515.82)	10 weeks	`7,50,000 (US\$ 11,051)	`8,52,871 (US\$ 12,567)	1324
Per Dropout Patient	`175 (US\$ 2.58)		`1,278 (US\$ 18.83)	`1,453 (US\$21.41)		2.25
* Considering cost of one vial of Anti Rabies vaccine `300, one ID syringe `9 and one IM syringe `4 # Considering salaries of Medical and paramedical faculties working at OPD and stationary, electricity, etc.						

Discussion:

The dropout rate found in study (20.64%) was lower than that reported by Gogtay NJ *et al* (31.8%)¹⁰ and Dhaduk, *et al* (34%)¹¹. The mean age for dropout was 28.88 with a standard deviation of 15.76, which was higher than the mean age of vaccine receiver found by S Sharma *et al*¹².

Majority of dropouts 90.6% were bitten by dogs, 8.4% by cats and 1% by other wild animals. The study findings are similar to findings of study conducted by Sudarshan MK⁶ and Ichhpujani RL *et al*¹³.

Each dropout case required mean 2.25 visits to hospital and 1.1 work/school days wasted due defaulting the process, these duration is nearly half than duration required by each patient who needs prophylaxis i.e. 4.4 visits to hospital and 2.2 work days mentioned in study conducted by Sudarshan MK⁶. Bulletin of WHO in 2009 and factsheet of Rabies by WHO in March 2016 has quoted that the approximate cost to vaccinate one individual seeking prophylaxis for Anti Rabies Vaccination in Asia is about US\$50¹⁴, annually around 2.1 million patients takes treatment for post exposure prophylaxis in India¹⁵, so according to this more than 100 million US\$ spent on vaccination. Different studies including this found almost 1/4th are dropout so annually more than 5 lacs patients in India left their treatment midway. Considering cost of one dropout of current study i.e 21.41 US\$ India is spending more than 10 Million US\$ on Anti Rabies vaccination dropouts which is almost 1/10th cost of Anti Rabies Vaccination in India.

Globally, estimates indicate that human mortality (due to endemic canine-mediated rabies) is highest in Asia, with the highest incidence and deaths reported in India¹⁵. In endemic countries where risk of asymptomatic carrier is high WHO recommend complete course of vaccination^{7,8} and whereas Indian government can only spend less than 4% of its GDP on health¹⁶ and being a lower middle

income country any wasteful resources is a relatively a serious concern.

Conclusion:

Rabies is endemic in India, out of 15 million victims more than 2 million seeks treatment for post exposure prophylaxis. Still 1/4th patients becomes dropouts which cost for almost 10 million US\$ i.e. 1/10th cost of Anti Rabies vaccination