



COST EFFECTIVENESS OF INTRADERMAL ANTI-RABIES VACCINATION- A HOSPITAL RECORD BASED STUDY IN CENTRAL INDIA.

Community Medicine

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ABSTRACT

Introduction: Rabies a 100% fatal disease is completely preventable with timely post exposure prophylaxis. According to the Gold standard Essen intramuscular regimen, five doses of 0.5 ml of anti rabies vaccine is required as compared to Updated Thai Red Cross intradermal regimen which requires four doses of only 0.1 ml each at 2 sites. Hence the present study was conducted to determine the cost effectiveness and compliance of 4 dose intradermal regimen of antirabies vaccine over 5 dose intramuscular regimen of anti rabies vaccine for post exposure prophylaxis. **Methods:** The present study is a hospital record-based study of 1020 cases attending antirabies vaccination clinic who received IM regimen of ARV in the year 2015 and 2256 cases who received ARV under ID regimen during 2021. The cost effectiveness and compliance of both regimen was estimated. **Results:** A total of 3276 animal bite patient were studied. Antirabies vaccine by the Intramuscular route was administered to 1020 patients in the year 2015. While around 2256 patients were administered the Antirabies vaccine by the Intradermal route in the year 2021 costing Rs.14,18,352. If same number of cases were to be given intra muscular vaccination then the cost of vaccination would be Rs. 35,19,360. Thus a saving of Rs. 21,01,008 was effected in ID regimen over IM regimen. 53.72% patients completed the Intramuscular route of Antirabies vaccine schedule and 73.04% patients completed the Intradermal route of Antirabies vaccine schedule. **Conclusion:** Intradermal regimen is more cost effectiveness than intramuscular (Essen) regimen. And the compliance to post-exposure vaccination is better in case of ID regimen as compared to IM regimen.

KEYWORDS

Antirabies vaccine, intradermal regimen, cost ,compliance

INTRODUCTION

Rabies a deadly viral infection is virtually 100% fatal acute viral encephalitis caused by an RNA virus belonging to family Rhabdoviridae and genus Lyssavirus. The disease is transmitted to humans by the bite, lick or scratch of an infected animal (1). It is estimated that 17 million animal bite cases and 20,000 human deaths occur due to rabies each year in India (2). Though rabies is 100% fatal at the same time it is totally preventable if managed appropriately and timely. However, legislation and implementation regarding dog population control through sterilization are not practiced adequately. In this situation, human pre-exposure and post-exposure prophylaxis together with vaccination of domestic animals and wildlife animals are currently the most efficient interventions. Deaths due to rabies can be prevented by appropriate post exposure prophylaxis (PEP) consisting of wound care, administration of immunoglobulin and administration of the complete schedule of anti rabies vaccine. The Gold standard Essen regimen consists of 5 injections i.e., having one intramuscular dose of 0.5ml vaccine each on days 0, 3, 7, 14, and 28. The compliance for the 5th dose (day 28) of rabies vaccine was found to be only about 60.8%. So, in February 2006, as per WHO recommendations drug controller general of India (DCGI) approved the use of Updated Thai Red Cross regimen which involves injection of 0.1 ml of reconstituted vaccine on two ID site on days 0, 3, 7 and 28. In this regimen, only 4 visits are needed to complete the vaccination. Thus reducing the indirect cost involved in terms of man hour cost, travel time and expenses for the skipped visit on day 14 (2). In the present study we have assessed the cost effectiveness of intradermal regimen over intramuscular regimen of antirabies vaccination and also the compliance of the intradermal regimen and intramuscular regimen of antirabies vaccination.

METHODOLOGY

The present study was a hospital record based study. Study subjects were animal bite patients attending anti rabies vaccination clinic of GMCH Nagpur. The duration of study was three months. A total of 1020 cases received ARV under IM regimen during 2015 and a total of 2256 cases received ARV under ID regimen during 2021. The cost effectiveness of both regimen was compared by calculating the cost of the total vials used for the animal bite cases in year 2021 for ID regimen and estimating the cost of the total vials used for the same number of patients if they were to be given intramuscular regimen, considering the recent cost of the ARV vial. The cost of ARV vial during 2021 was Rs.312. The number of doses received by each individual were recorded to calculate the compliance of intradermal and intramuscular regimen.

Ethical Approval Procedures

Approval from Institutional Ethics Committee was obtained. Permission of the head of the department of Community Medicine was obtained. Permission of the incharge faculty for the ARV OPD was taken.

DATA COLLECTION METHOD

Data was collected from hospital records which included entries of patients coming to ARV center for post exposure prophylaxis. The data was analyzed using Epi Info software. The results were expressed as frequencies and proportions. Appropriate statistical tests were applied.

RESULTS

In the present study among the animal bite patients, 73 % were males and 28% were females. As seen in table.no.1, about 36% of the study subjects were in the age group below 20 years. Majority of the patients (91%) were dog bite cases and the rest (9 %) were other animal bites comprising of cats, cattle and wild animal bites. Most of the patients (58%) were diagnosed of having category 3 bite and 41 % had category 2 bites.

Table- 1 Age And Sex Distribution Among Dog Bite Cases Receiving Im Regimen And Id Regimen.

Age group	No. Of patients in IM Regimen		No. Of patients in ID Regimen		TOTAL (%)
	Male patients	Female patients	Male patients	Female patients	
below 20	252	84	647	256	37.82
21 to 40	224	108	633	96	32.38
41 to 60	128	84	288	192	21.12
61 to 80	104	32	112	32	8.54
81 above	4	0	0	0	0.12

A total of 5100 vials were used for 1020 cases during 2015 for intramuscular (IM) regimen. A total of 4546 vials were used for 2256 cases during 2021 for intradermal (ID) regimen costing around Rs.14,18,352. If the same number of cases were to be given vaccination by intra muscular regimen then 11280 vials would have been required and the cost of vaccination would be approximately Rs. 35,19,360 as shown in table.no.2. Thus a saving of Rs. 21,01,008 was effected in ID regimen over IM regimen.

Table No. 2: number Of Vaccine Vials Used And Its Cost For Anti-rabies Vaccine.

Rabies vaccine used	Amount required (ml) per dose	Cost per vial (in Rs.) (Govt. supply)	No. of vials used for 2256 patients*	Total cost
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ID regimen	0.2	312	4546	14,18,352
IM regimen	0.5	312	11280	35,19,360

* For ID regimen a wastage 1.5% was considered while for IM regimen there was no wastage.

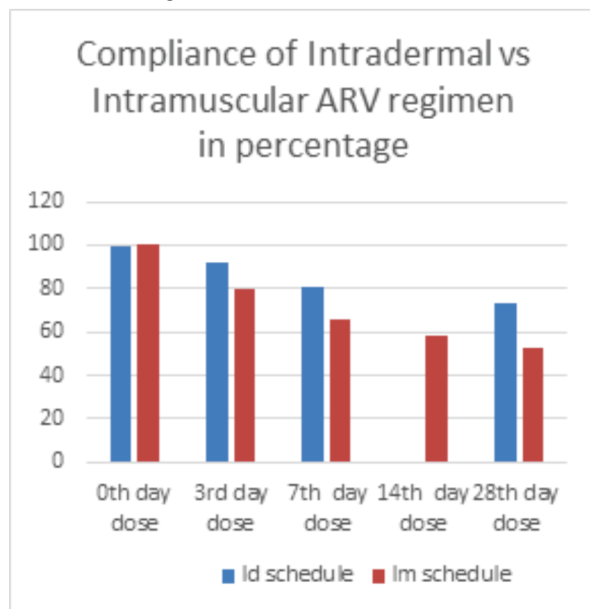


Figure No.1:compliance Of Intradermal Vs Intramuscular Arv Regimen In Percentage

Table No.3: Compliance Of Patients Of Intradermal Schedule Vs Compliance Of Intramuscular Schedule.

Route	Completed schedule	Partially completed schedule	Total	Chi square test	P value
ID regime (2021)	1648 (73.04%)	608 (26.95%)	2256	X ² = 118.69	p < 0.00001
IM regime (2015)	548 (53.72%)	472 (46.27%)	1020		
TOTAL	2196	1080	3276		

As shown in figure.1, 548 (53.72%) patients completed the Intramuscular Antirabies vaccine schedule and 1648 (73.04%) patients completed the Intradermal Antirabies vaccine schedule. The compliance of patients for taking ARV was found to be higher among intradermal regimen than intramuscular regimen which was statistically significant $X^2 = 118.69$, $df = 1$, $p < 0.00001$

DISCUSSION

High cost of intramuscular administration of ARV is a limiting factor for its wider use among common people in a country like India, hence there is a need for a cost effective vaccination schedule to make the post exposure prophylaxis more sustainable. Intradermal vaccination schedule reduces the indirect cost involved in terms of man hour cost, travel time and expenses for that visit. The present study investigated the cost effectiveness and compliance of intradermal regimen over intramuscular regimen of antirabies vaccination.

In the current study 36% of the study subjects were in the age group below 20 years and 32% were in age group of 21 to 40 years, this shows that younger aged people are more prone for animal bites and children indulging in playful activities makes them more vulnerable to animal bites, and their lower ability to react to any kind of threat situation makes them susceptible to falling prey to the animal. Similar findings were shown by a study done by Prachi et al were younger aged people were more affected by animal bites (3).

The findings of the present study showed that 72% animal bite patients attending ARV center were males. These findings are in line with studies reported by Dinesh et al, Haradanahalli et al and Kiran et al which showed that males were the predominant victims for animal bites (2,4-5). This male predominance could probably be because males are more involved in outdoor activities in comparison to females.

In the present study it was found that 4546 vials were used for intra

dermal vaccination in 2256 cases costing Rs.14,18,352. If same number of cases were to be given intra muscular vaccination then the cost of vaccination would be approximately Rs. 35,19,360. Thus a saving of Rs. 21,01,008 was effected in ID regime over IM regime. That is there will be a 60% reduction in cost of vaccination by intradermal regimen. Prachi et al also found in their study that vaccine cost was reduced to 50% for 4814 patients during 2017 costing Rs. 3,90,420 with intra dermal administration which would be approximately Rs 7,80,570 with intra muscular administration (3). Rahim et al found that about 70% of vaccination cost could be saved during the year 2007 if ID route of administration had been followed in their clinic (6). The present study emphasizes the economic benefit of using ID regimen, as only 0.8 ml of vaccine is needed for each patient resulting in use of less than 1 vial per patient as opposed to 5 vials per patient that receive ARV vaccination through IM regimen

The present study stated that 73.04% was the compliance of intradermal vaccination schedule as compared to 53.72% for intramuscular schedule which was similar to the study finding of R Mankeshwar et al who observed the compliance was more in intradermal vaccination schedule (84.2 %) as compared to intramuscular vaccination schedule (40%) and the difference was highly significant (1). Study done by Anandraj R et al reported 82.6% completed the intradermal schedule of ARV (7). Kiran et al also found in their study that the compliance of intradermal vaccine was 65.3% compared to 40.2% for the intramuscular vaccine which was similar to findings of the present study (2). The Intradermal regimen requires four doses as compared to intramuscular regimen which consists of five doses, thus saving one visit reduces the indirect cost involving the travel expenses and loss of wages resulting in increased compliance.

CONCLUSION

In our setting, the Intradermal regimen was cost effective as compared to the Intra muscular regimen and increased patient compliance was more better in intradermal regimen compared to intramuscular regimen of vaccination.

Recommendation

Intradermal regimen is cost effective and has better compliance. Hence Intradermal regimen of antirabies vaccine should be adopted universally.

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Conflict Of Interest- There are no conflict of interest

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