Original Article

MASS DRUG ADMINISTRATION WITH TRIPLE DRUG THERAPY FOR ELIMINATION OF LYMPHATIC FILARIASIS - FIRST EXPOSURE IN SIMDEGA, A TRIBAL DISTRICT OF JHARKHAND, INDIA

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ABSTRACT

Background: In 2004, Government of India (GoI) launched a campaign to eliminate Lymphatic Filariasis (LF) through mass

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drug administration (MDA) with Diethylcarbamazine (DEC) alone and later with DEC and Albendazole. The programme has made significant progress with microfilaria (mf) level below 1% in 222 of 255 implementation units (IUs) till 2015. Despite these efforts, many districts remain endemic for LF even after multiple rounds of MDA. Even in some reportedly non-endemic districts, foci of LF manifestations have been noticed while doing resurvey to know the current status of LF endemic districts in the country. India's commitment to eliminate LF has led to revision in strategic planning and introduction of three drugs combination, viz., Ivermectin, DEC and Albendazole (IDA), as a pilot project in identified districts.

Methods: Simdega, a district in Jharkhand state, with a population of about 6 lakhs as per census of India-2011 and decadal growth rate of 16.56% was identified for the pilot project based on the observation of high *mf* rate by Indian Council of Medical Research (ICMR). Intensive IEC activities were undertaken by the health workers to reach community for achieving drug compliance above 65%. The monitoring by active Rapid Response Teams to tackle serious adverse events was executed following the programme guidelines.

Results and Discussions: The first round of IDA fulfilling all necessary pre-requisites before observing MDA has shown spectacular success in achieving the drug compliance above 90% and given a hope to eliminate the disease in a short span of time. The independent assessment of MDA also concluded that drug compliance was above the desired level of 65%. The MDA with IDA, implemented for the first time, had lot of challenges but advantages too as motivating and convincing the community was easier as compared to those districts where MDA had been in operation for many years. Though MDA was being implemented in 17 districts of Jharkhand since 2004-05, the drug compliance during MDA in Simdega was much higher than desired level. This could be achieved because the focus of the state was on only one district during MDA which was observed individually whereas in earlier

years, MDA was observed simultaneously in all 17 endemic districts which diluted the focus. To sustain such focused approach with existing human resource, it was felt that MDA should be done in a staggered manner.

Keywords: albendazole, DEC, ELF, IDA, ivermectin, MDA

INTRODUCTION

Globally, 856 million people in 72 countries are currently estimated at risk of lymphatic filariasis (LF).[1] The South-East Asia region, in particular, accounts for a significantly high burden of LF with India contributing to about 40% of the global burden.[2] The population requiring preventive chemotherapy for LF is spread across 256 districts identified as endemic for LF[3,4]. In 2004, Government of India (GoI) launched a campaign to eliminate LF through mass drug administration (MDA) with Diethylcarbamazine (DEC)[4] alone and later with DEC and Albendazole.[5] GoI's current strategy includes annual MDA with DEC and Albendazole for a duration of five or more years for the population in endemic areas (excluding children under two years, pregnant women, and the seriously ill) as main pillar and home-based morbidity management for persons with manifestations of the disease as second pillar with surgical intervention for hydrocele.[6] The programme has made significant progress with mf levels below 1% in 222 of 255 implementation units (IUs) in 2015.[7] Despite these efforts, many districts remain endemic for LF even after multiple rounds of MDA.[8-9] Even in some reportedly non-endemic districts, foci of LF manifestations are recorded while doing resurvey to know the current status of LF endemic districts in the country.[10-11] India's commitment to eliminate LF in endemic areas will require addressing several challenges, viz., adoption of new technologies of triple drug therapy – Ivermectin + DEC + Albendazole (IDA) for LF control, operational challenges related to programme planning and sustainable financing and non-compliance issues.

The study of November, 2015 with combination of Ivermectin + DEC + Albendazole undertaken in Papua New Guinea[12] evidenced faster and sustained reduction in microfilaria among community. The initiative of National Vector Borne Disease Control Programme (NVBDCP), Government of India[13] for a multi-country trial on IDA for its feasibility through ICMR included one district-

Simdega in Jharkhand, along with other 4 districts in different states of India for piloting. Simdega was the only district identified in group of 4 districts which had never experienced MDA earlier.

Jharkhand state comprises 24 districts out of which 17 districts were already identified as endemic for LF. Annual MDA with DEC alone was initiated in 15 endemic districts during 2004; however, the number of districts became 17 due to creation of Khunti and Ramgarh from erstwhile endemic district only. Two-drug (DEC+Albendazole) combination therapy was implemented since 2009 in all these endemic districts. The challenge of sustaining improved drug compliance to have desired impact became a critical issue due to various reasons although the reported MDA coverage in these districts was high. The need of implementing MDA for shorter duration with more effective combination came as ray of hope towards achieving elimination faster. Simdega district, which was not covered under MDA during these years, has a population of about 6.7 lakhs (as per census of India-2011 with decadal growth rate of 16.56%). It was identified by Government of India during first expanded implementation of triple drug therapy with Ivermectin, DEC, Albendazole (IDA) as a pilot project during 2019. The selection of this district was justified on account of a survey, carried out in eight villages in Bano PHC of Simdega district in 2015 by the Ranchi Field unit of National Institute of Malaria Research (NIMR) of Indian Council of Medical Research (ICMR) which showed that microfilaria prevalence was above 1% in all the villages. During the night survey, blood smear from 2190 individuals, out of a population of 5056, were collected which showed average microfilaria rate of 6.1%, ranging from 1.2% to 15.2% in different villages. Only *Wuchereria bancrofti* prevalence was reported. Antigenemia test was done among a small group of 30 children of 2-5 years age and seven were detected positive (23.3%) for filarial antigen. Disease rate ranged from 1.2% to 8.1%, with an average of 4.4%. Line listing of clinically manifested LF cases carried out by the District NVBDCP in 2018, covering all the blocks revealed 675 hydrocele and 170 lymphoedema cases from 95 villages in all the seven blocks which ranged from 18 to 316 in different blocks. Based on the above results of NIMR and district survey, Simdega district was considered as LF endemic requiring IDA-MDA under the accelerated plan of LF elimination.

MATERIAL AND METHODS

Area of Pilot project:

Simdega district comprises 10 blocks (Fig. 1) and 440 revenue villages. The whole district was brought under MDA with IDA and population enumeration was done during MDA.

The target population:

It was two years and above, exempting pregnant women and seriously ill people for DEC + Albendazole (Ivermectin was given to those who were above 5 yrs of age only). A single oral dose of 3- drugs was administered during MDA.

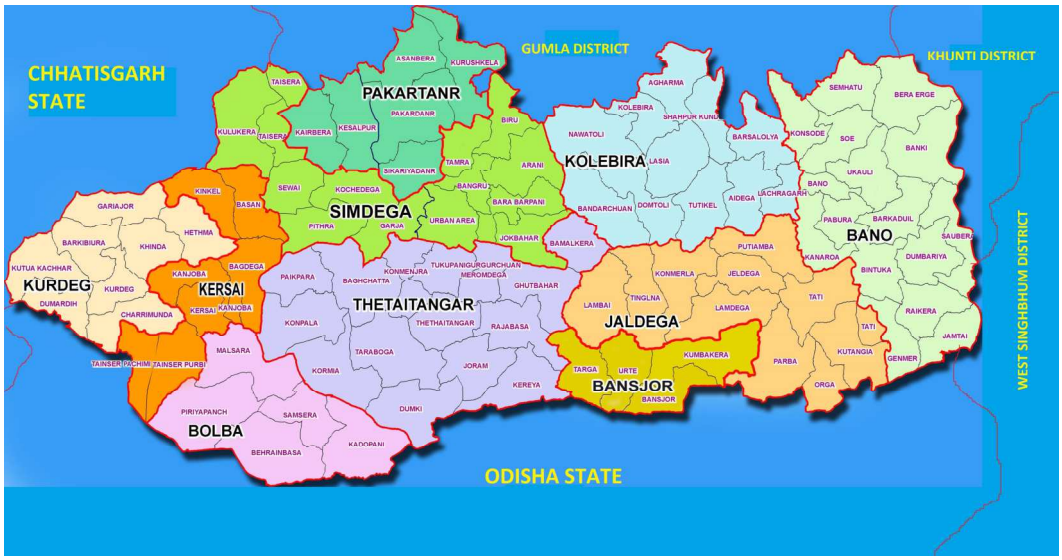

Fig. 1. Map of Simdega District showing Blocks.

Although Ivermectin is recommended to be administered @ 200µg/ kg of body weight, however, for practical purposes, it was administered based on height whereas, DEC was based on streamlined dose for different age groups as per national guidelines (1 tab. of 100mg for 2-5 yrs; 2 tablets of 100mg for 6-14 yrs and 3 tablets of 100mg for 15 yrs and above), and Albendazole 400mg tablet was given as fixed dose to all age groups in eligible population. A dose-pole was used to

measure the height of the individuals to decide the number of Ivermectin tablets (3mg) to be given. The children up to the height of 3 feet (90cm) were not given any tablet of Ivermectin, whereas 1 tablet of Ivermectin (3 mg) was given for children up to the height of 4feet 7 inches (140cm); 3 tablets to those for measuring up to the height of 5feet 2 inches (158cm) and 4 tablets to those measuring above 5feet 2 inches. This was the innovation made for facilitating drug administration in field with the support of PATH.

Period of Drug Administration:

Camps were conducted in schools on 10-11th January, 2019 to treat children. Subsequently on 12thJanuary, 2019, the booths were organized in the Anganwadi centres (these centres are established in India to improve health, nutrition and education of children under integrated child development services) for MDA with IDA. Drug administrators with a target of 50 houses made house visits to treat the household members from 12-15th January, 2019. Every drug administrator was provided with dose-pole (Fig. 2) to determine the number of Ivermectin tablets. As the number of dose poles received from stakeholders was limited, flex banner of measurement 6'' × 72 '' equivalent to 432 sq. inch (3 sq. feet) were prepared for measuring the height of beneficiaries. All Anganwadi centres/Health sub-centres/Schools/ Office of Ward members were identified as booths where these flex banners were pasted on the walls to take measurement.

Fig. 2. Dose Pole.

Stick dose poles were used during door to door approaches while Flex banner dose poles were used during booth approaches for drug compliance in the field.

During this period, repeat visits were made for mopping the absentees. Booth approach involving schools and Anganwadi centres for drug administration followed by house to house visit through Anganwadi workers and / Accredited Social Health Activists (ASHAs), known as Sahiyas (lady friend) in Jharkhand was adopted. Finger marking for drug administered people as an innovative approach was adopted helping to identify those people who haven't taken the drugs. Considering the start of IDA as fresh, the programme followed A-Z approach. The approach was divided in different stages:

Functional Rapid Response Team (RRT):

RRT headed by Medical Officer with mobility support was established in each block. Medical officers were pooled from nearby district, Gumla, Khunti and West Singhbhum during the campaign to attend to all reported adverse events in the field during drug administration. Serious adverse events (SAE) were immediately hospitalized.

Capacity Building:

Quality training was imparted by deploying State Level expert consultants and staff at all district and block levels. Simplified training manual was prepared in local 'Hindi' language for facilitating the service providers as well as for the beneficiaries.

Social Mobilization:

Intensive Information Education Communication (IEC) and Behavior Change Communication (BCC) activities were carried out for motivation of both service providers and community to implement the MDA with IDA and improve drug compliance. The steps taken for such intensive campaign were:

- Sensitization of District Collector by State Health Team;
- Holding district level Task Force Meeting twice with different departments prior to the campaign in presence of State representatives;
- Special School Awareness programme named as 'Bhag Filaria Bhag' (meaning Go Filaria Go) in all schools starting 15 days prior to IDA;

- Press release done on every evening for 30 days prior to IDA and during IDA Campaign;
- Sensitization of 400 block level public representatives viz., Village Head (Mukhiyas), elected ward member (Parshad), Forest committee (Van Samiti), Tribal Welfare Committee (Adivasi kalyan samiti) by District Collector, Civil Surgeon Cum District Vector Borne Disease (VBD) Officer /District Malaria Officer & NGO workers;
- Advocacy of Faith Based Organizations, posters, banners in all booths, displaying hoardings at major public places, announcing with mike by specific route charts;
- Involvement of 'Jharkhand State Livelihood Promotion society';
- In addition, the MDA with IDA was launched as committed campaign by District Collector at District headquarter in presence of Team of central level officers and in Block by Block Development Officer in presence of members from State Team;
- For community awareness, special cap with IDA were printed for all volunteers in field.

Reporting:

Daily reporting was made mandatory during campaign of MDA with IDA. The reporting formats were simplified which included only four formats as indicated below:

IDA 1 - Format for Drug Administrator— deputed 2 in each Booth

IDA 2 - Format for Drug Supervisor— deputed 1 for 5 Booth

IDA 3 - Format for Block level Supervisor for receiving report from Drug Supervisor in evening during the campaign

IDA 4 - Format for district headquarter to send report to State headquarter.

Monitoring & Supervision:

Monitoring and spot supervision were strengthened by ensuring following steps:

- Daily reporting from each Block was ensured every day and was reviewed in presence of State and District team at 8.00 PM by District Collector.
- Block Development Officers of poor performing blocks were directed to review the progress themselves.
- State Consultants were stationed in the District during the entire campaign.
- All reports were shared with Health Secretary on daily basis by State Programme Officer for VBD.

RESULTS AND DISCUSSIONS

The total population of the district (which includes eight reporting units viz. Simdega, Kolebira, Bano, Jaldega, Kurdeg, Tetaitanger, Bolba and Urban Area) after enumeration was 650412 out of which 572363 persons were eligible for MDA with triple drug. The data from all the eight reporting units of the district Simdega revealed that 519571 persons were administered the drug (Table 1). Thus the compliance rate of 90.78% against eligible population was achieved during the first round of MDA in Simdega district with triple drugs.

Table 1. Coverage during IDA-MDA

SN	Name of PHC	Total Population (Enumerated)	Targeted Population	Population consumed drug
1	Simdega	109914	96724	87242
2	Kolebira	74243	65334	62437
3	Bano	91132	80196	71755
4	Jaldega	107059	94212	85284
5	Kurdeg	97211	85546	77067
6	Tetaitanger	97228	85561	77392
7	Bolba	34349	30227	27001
8	Urban Area	39276	34563	31393
	Total (Enumerated)	**650412**	**572363**	**519571**

Intensive Social mobilization through state, district agencies involving Self-help groups, media, local religious leaders like Bishops, Maulwis, Priests and partners like Project Concern International (PCI) added to awareness generation

leading to improved drug compliance. Three-Day Students campaign - '*Bhag Filaria Bhag'* gave a boost to programme implementation.

The experience of suboptimal compliance during MDA in other 17 LF endemic districts of Jharkhand helped in planning and taking precautions during the process. There were many challenges for implementation of MDA with three drugs. Consumption of eight medicines at a time was a big challenge which was coupled with the issue of administering DEC age-wise and Ivermectin as per height. The innovation was made using 'Flex banner dose -pole' for measuring height but it was felt that Combi-Blister pack for MDA with IDA would be a better choice.

The adverse events due to drug was monitored which revealed that during MDA, 302 persons reported adverse drug reactions. Out of these, 118 reported nausea, vomiting and headache, including 8 people who required hospitalization but they all were discharged after some time as the drug reactions were mainly headache and dizziness which was mild and subsided within 2-3 hours. Out of remaining 184 people reporting adverse event, 104 had gastric problem and 80 person developed mild fever including 17 who already had lymphodema manifestations. The post-MDA assessment was undertaken independently by the Department of Preventive and Social Medicine, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand which revealed minimal and non-specific side-effects with maximum people complaining about dizziness/giddiness and lethargy.

Vector Control Research Centre (VCRC), Puducherry under Indian Council of Medical Research (ICMR) was also involved in monitoring of MDA with IDA and as per their observation (unpublished) undertaken after about 20 days of MDA, it was found that out of 902 people who reported to have consumed the drugs, 132 experienced adverse events. Dizziness was the most common (42%) among the adverse events (AEs). AEs were reported to be self-limiting, lasting from a few hours to three days.

The constitution of Rapid Response Teams (RRTs) and their immediate arrival in field played a major role in removing the fear as the AEs were managed. This action ultimately developed the confidence among community and improved drug compliance. The advocacy and involvement of district administration was the key to successful implementation of MDA.

The success was shared with 'NITI Ayog*'* of Government of India indicating that it may be a role model for other districts to be covered with IDA in future. The same was appreciated and significant achievement was recognized.

The team of VCRC, Puducherry did coverage assessment during monitoring. As per their reports, out of the total sampled population of 1078 during assessment survey, only 902 (83.7%) consumed the drugs. Age-specific analysis indicated that all the age classes (5-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50,51-55,56-60 and above 60) had more than 65% coverage. There was no significant difference in the surveyed coverage between females (84.3%) and males (83.1%) (p=0.6). Out of sample population of 1078 for compliance survey, it was revealed that 995 people were eligible for MDA and 83 were ineligible. Out of eligible population, 93 people did not consume the drug. Among the non-compliant people, 66 reported that they were away from the village during MDA/ IDA campaign, 14 reported that they were not aware of the programme while 9 did not consume the drug due to fear of side reaction and rest 4 could not be traced during the assessment.

IDA coverage and evaluation survey were also carried out independently by Department of Preventive and Social Medicine, Rajendra Institute of Medical Science which reported that the programme reach in the population was approximately 82.1%.

CONCLUSION

The MDA with IDA as a fresh initiative had lots of challenges and advantages too as motivating and convincing the community was easier than in those districts where MDA has been in operation for many years. Further, the focus was on only one district from the state which could be managed with existing human resources. The coverage of above 90% across all the reporting units became instrumental in taking it forward. This could be achieved because the focus of the state was on only one district during MDA which was observed individually whereas in earlier years, MDA was observed simultaneously in all 17 endemic districts thereby diluting the focus. To sustain such focused approach with existing human resource, it was felt that MDA should be done in staggered manner.

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Conflict of Interest: The authors have none to declare.

REFERENCES

1. World Health Organization. Global programme to eliminate lymphatic filariasis. Progress Report 2015, Weekly Epidemiological Record. 2016; 91(39): 441-60.
2. World Health Organization. Lymphatic filariasis infection and disease control strategies. Report of a consultative meeting held at Universiti Sains Malaysia, Penang, Malaysia. 1994:1-6.
3. National Vector Borne Disease Control Programme. Accelerated plan for elimination of lymphatic filariasis. 2018; Available from:
   https://nvbdcp.gov.in/WriteReadData/l892s/1031567531528881007.pdf, (accessed on November 13, 2020).
4. Srivastava PK, Dhariwal AC. Lymphatic filariasis elimination: Update for mission possible. In: Tyagi B (ed.) Lymphatic Filariasis. Singapore, Springer; 2018. p. 15-32.
5. National Vector Borne Disease Control Programme. Guidelines for Filariasis control in India and its Elimination. 2009; Available from:
   https://nvbdcp.gov.in/WriteReadData/l892s/43461824631532409675.pdf, accessed on November 13, 2020.
6. Srivastava PK, Dhillon GPS. Elimination of lymphatic filariasis in India-A successful endeavour. J Indian Med Assoc. 2008; 106 (10): 673-4.
7. Srivastava PK, Dhariwal AC, Bhattacharjee J. Status of lymphatic filariasis in India. Health Action, 2013; 26 (6):19. ISSN No. 0970-471 X.
8. Srivastava PK, Bhattacharjee J, Dhariwal AC, Krishnamoorthy K, Dash AP. Elimination of lymphatic filariasis – Current status and way ahead. J Commun Dis. 2014; 46 (2): 85-94.
9. Dhariwal AC, Srivastava PK, Bhattacharjee J. Elimination of lymphatic filariasis in India: An update. J Indian Med Assoc. 2015; 113 (12): 189-190.

10. Foo PK, Tarozzi A, Mahajanb A, *et al*. High prevalence of *Wuchereriabancrofti* infection as detected by immune-chromatographic card testing in five districts of Orissa, India, previously considered to be non-endemic. Trans R Soc Trop Med Hyg. 2010; 105(2): 109–14.
11. Chand G, Barde PV, Singh N. Emergence of new foci of filariasis in Madhya Pradesh, India. Trans R Soc Trop Med Hyg. 2013; 107 (7): 462-4.
12. Thomsen EK, Sanuku N, Baea M, *et al*. Efficacy, safety, and pharmacokinetics of coadministereddiethylcarbamazine, albendazole and ivermectin for treatment of Bancroftian filariasis. Clin Infect Dis. 2016; 62(3): 334–41.
13. Weil GJ, Bogus J, Christian M, *et al*. The safety of double- and triple-drug community mass drug administration for lymphatic filariasis: A multicenter, open-label, cluster-randomized study. PLoS Med. 2019; 16(6): e1002839 Available from: https://doi.org/10.1371/journal.pmed.1002839.

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