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**Original Research Article**

# Mass Drug Administration Coverage Evaluation for Elimination of Lymphatic Filariasis in Nagpur District of Maharashtra

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**Abstract**

**Introduction:** *Lymphatic filariasis is an important public health problem in India. Nagpur district In Maharashtra is one of the endemic district where Mass drug administration activity is undertaken every year to eliminate lymphatic filariasis.*

**Objectives***: To evaluate mass drug administration for elimination of lymphatic filariasis in terms of actual coverage, compliance rates of MDA, the reasons for non-compliance and drug related side effects in Nagpur district.*

**Methods:** *The guidelines of National Vector Borne Disease Control Programwas used to select a total of 120 households from three villages and one urban town using two stage random sampling method. 30 households were covered in each clusters and data was collected using predesigned questionnaire. Data was analyzed manually and z score was calculated using z score calculator.*

**Results:** *A total of 120 households were surveyed in Nagpur district with a population coverage of 589. The present study revealed population coverage of 81.66%, compliance rate of 95.24%, Coverage Compliance Gap of 4.76% and effective coverage of 77.78%. Rural area had better effective coverage as compared to urban area (Z score =9.732, p value =0.00018).*

**Conclusion:** *In spite of average coverage in Nagpur district, widespread rural-urban variation in performance status, lack of supervised drug dosing revealed by the present study is remain the important areas of concern. Both drug coverage and compliance needs to be improved. Stress to be given in urban area for better compliance.*

**Keyword:** *Mass drug administration, Coverage rate, Compliance rate, Coverage Compliance Gap, Effective coverage rate.*

## Introduction

Lymphatic filariasis (LF) is a mosquito-borne neglected tropical disease. It leads to chronic disability as a result of the damage caused by infections of the lymphatic vessels with three important species of filarial parasites: *Wuchereria bancrofti*, *Brugia malayi* and *B. timori*. World Health Organization estimated that, 120 million people in tropical and subtropical areas of the world are infected with lymphatic filariasis and accounts for at least 2.8 million DALYs, as one of the leading cause of global disability. [1]

Indigenous lymphatic filariasis cases are reported from 20 States/UTs namely Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal, Puducherry, Andaman & Nicobar Islands, Daman & Diu, Lakshadweep and Dadra & Nagar Haveli with a population of about 600 million at risk. Total of 250 districts have been identified to be endemic for filariasis.[2]

The national filaria control program was launched in 1955 to undertake control measures in endemic areas. The control measures included mass Diethyl Carbmazine (DEC) administration, anti-larval measures in urban areas and indoor residual spray in rural areas.[3] This program became a part of National Vector Borne Disease Control Programme (NVBDCP) in 2003 and its aim was to eliminate lymphatic filariasis by 2015 under National health policy 2002.[4] Government of India launched nationwide Mass drug administration (MDA) in 2004 in endemic areas. In MDA, the drug is to be consumed in the presence of the drug distributor and DEC is given to almost everyone in the filarial endemic area irrespective of the symptoms. Age wise dosage of a single dose of DEC 100 mg tablet (2-5 years= 1 tablet, 6-14 years= 2 tablets, 15 years and above = 3 tablets) once a year is recommended for all except for children below 2 years, pregnant women and very sick patients. [3] The principle behind this is that, a single administration of DEC annually for 4-6 years consecutively will interrupt the transmission of filariasis. [5] In addition to this, a single dose of albendazole (400 mg) is administered to control worm infestations. In Maharashtra, MDA coverage was 93.58% in 2014. [6]

The present study was conducted to assess the program in terms of actual coverage, compliance rates of MDA, the reasons for non-compliance and drug related side effects in Nagpur district.

**Methodology**

Mass drug administration of DEC was carried out in Nagpur district on 19th and 20th August 2017. A community based cross-sectional study was conducted on 9th and 10th September 2017 for the evaluation of Mass drug administration. A household survey was conducted in four selected clusters (three rural and one urban) of Nagpur district of Maharashtra as per NVBDCP guidelines. [2]

The evaluation team constituted of faculty members and post graduate students of the Department of Community Medicine. The objective was to study the coverage of MDA activity and compliance, reason for non-compliance and drug related side effects.

Sample size: In Nagpur districts, four clusters (3 rural and 1 urban) of 30 households each were selected. DMO of Nagpur district provided the list of 64 PHCs in the district to be covered by medical college. The PHCs were stratified in to 3 groups depending upon MDA coverage as

Category-I: PHC with coverage below 50%

Category-II: PHC with coverage between 50-80%

Category-III: PHC with coverage above 80%

There was no PHC in category I and one PHC in category II. Hence, one PHC from category IIand two PHCs from category-III were selected.

PHCs were selected randomly and one village from each PHC was selected randomly using currency note for random number generation. In each village, 30 households were covered.

There were 10 urban areas (towns) in Nagpur district. Out of 10 urban area one town was selected randomly. One ward was selected randomly from the town using currency note. In this way, a total of 120 households were surveyed for the purpose of MDA evaluation.

The selected 3 villages and one urban area were designated as clusters. Selected villages from PHCs were Sukali (PHC:Kodhamendhi), Digras (PHC:Yenwa) and Bhuyari (PHC:Vyahaad). In urban area, Azad Nagar (Town: Kamptee) was selected.

The house for the beginning point was selected randomly and the team moved in a particular direction. House to house survey was carried out. A predesigned questionnaire (provided by NVBDCP) was used for data collection regarding consumption of DEC and other relevant

information. [2] After introducing ourselves and properly explaining the purpose of our visit, all the houses were willingly participated in the study till we could cover 30 houses in each cluster. Assessment was conducted for 2 days.

Working definitions adopted for drug coverage and drug compliance are as follows:

**Drug coverage**: It is the number of eligible persons who received DEC during MDA campaign.

Drug coverage (%) = Total no. of persons received the drug / eligible population x 100

**Drug compliance:** It is the number of persons who all ingested DEC in the presence of drug distributor during MDA campaign.

Drug compliance (%) = Total no. of persons who ingested drug / Total no. of persons who received the drug x 100

**Coverage compliance gap:** people who all got the drug but did not consume due to any reason.

**Effective coverage rate:** It is the end product of coverage by the health system and compliance by the community.

Effective coverage (%) = No. of people who had ingested sufficient dose of DEC tablets / Total people eligible for receiving DEC tablet x 100.

The data obtained were analyzed manually and descriptive data was expressed in frequency and percentages. P value and z test was calculated using Z test calculator.[7]

Since this study did not involve patient intervention method and it was based on questionnaire survey; hence ethical issue doesn't arise.

## Result

Four clusters including three rural and one urban were studied. A total of 120 households were surveyed in Nagpur district with a population coverage of 589.

**Table1:** Distribution of population of surveyed districts

| Area Covered | Total population | Eligible population | | Population covered (out of eligible) | |
|---|---|---|---|---|---|
| | | N | % | N | % |
| Sukali | 159 | 158 | 99.37 | 152 | 96.20 |
| Digras | 136 | 130 | 95.59 | 124 | 95.38 |
| Bhuyari | 125 | 122 | 97.60 | 97 | 79.51 |
| Kamptee | 169 | 157 | 92.89 | 90 | 57.32 |
| Total | 589 | 567 | 96.26 | 463 | 81.66 |

Table 1 showed distribution of population surveyed in four clusters. Out of 589 individuals, 567 (96.26%) were found to be eligible for drug administration. Of 567 eligible population, 463 (81.66%) received DEC from drug distributor (DD). Overall coverage rate was found to be 81.66%.

**Table 2:** Compliance rate, coverage–compliance gap, and effective coverage rate in study area

| Area covered | Eligible population | DEC given by DD | Consumed (compliance rate) | | Coverage–compliance gap % | Effective coverage rate % |
|---|---|---|---|---|---|---|
| | | | *N* | % | | |
| Sukali | 158 | 152 | 152 | 100.00 | 0.00 | 96.20 |
| Digras | 130 | 124 | 117 | 94.35 | 6.65 | 90.00 |
| Bhuyari | 122 | 97 | 93 | 95.87 | 4.13 | 76.22 |
| Kamptee | 157 | 90 | 79 | 87.77 | 12.23 | 50.31 |
| Total | 567 | 463 | 441 | 95.24 | 4.76 | 77.78 |

Table 2 showed compliance rate, Coverage Compliance Gap (CCG) and effective coverage rate. Two out of three rural clusters had marginally better coverage (96.26% and 90.00%) as compared to one rural and urban cluster (76.22% and 50.31%).

**Table 3:** Drug coverage and compliance rates in urban and rural settings

| Area | Coverage rate (%) | Compliance rate (%) | CCG (%) | Effective coverage rate (%) |
|---|---|---|---|---|
| Urban (*N* = 157) | 57.32 | 87.77 | 12.23 | 50.31 |
| Rural (*N* = 410) | 90.97 | 97.05 | 2.95 | 88.29 |
| Total (*N* = 567) | 81.66 | 95.24 | 4.76 | 77.78 |
| *Z* Score | 9.2645 | 3.7116 | - | 9.732 |
| P value | 0.0001* | 0.0002* | - | 0.00018* |

*significant

Table 3 showed that Coverage rate, Compliance rate and effective coverage rate was significantly higher in rural areas as compared to urban area.

**Table 4:** Beneficiaries swallowed tablets in presence of drug distributor in study area

| Area Covered | Eligible population | Swallowed in presence of Drug Distributor | |
|---|---|---|---|
| | N | N | % |
| Sukali | 158 | 139 | 87.97 |
| Digras | 130 | 94 | 72.30 |
| Bhuyari | 122 | 65 | 69.89 |
| Kamptee | 157 | 58 | 36.94 |
| Total | 567 | 356 | 62.79 |

Table 4 showed that number of beneficiaries swallowed drug in presence of drug distributor was better only in one rural village.

**Table 5:** Reasons for not swallowing drug

| Reason | Rural | | Urban | | Total | |
|---|---|---|---|---|---|---|
| | no | % | no | % | no | % |
| a) Drug was not delivered | 37 | 77.08 | 67 | 85.90 | 104 | 82.54 |
| b) Fear of drugs | 2 | 4.17 | - | | 2 | 1.59 |
| c) Side reaction of drugs | 2 | 4.17 | - | | 2 | 1.59 |
| d) Beneficiaries not suffering from LF, why they should take DEC? | 3 | 6.25 | - | | 3 | 2.38 |
| e) Forgot to take | 4 | 8.33 | 11 | 14.10 | 15 | 11.90 |
| Total | 48 | 100.0 | 78 | 100.0 | 126 | 100.0 |

Table 5 showed out of 567 eligible population, 104 did not receive the drug and 22 not consumed in spite of receiving the drug. The main reason for not swallowing the drug was, drug distributor failed to deliver the drug in both rural (77.08%) and urban areas (85.90%). The other important reason was forgot to take drug after meals (11.90%).

Adverse reaction to DEC was reported only by 06 persons (1.38%) out of 441 people who consumed the drug and all were having mild symptoms like nausea, vomiting, mild fever etc.

**Table 6:** Distribution of households regarding awareness about MDA (n= 30):

| Area covered | Awareness about MDA | |
|---|---|---|
| | Yes | No |
| Sukali | 28 (93.33%) | 02 (06.66%) |
| Digras | 30(100.00%) | - |
| Bhuyari | 26 (86.67%) | 04 (13.33%) |
| Kamptee, | 20 (66.67%) | 10 (33.33%) |
| Total | 104 (86.67) | 16 (13.33%) |

Table 6 showed that 104 households (86.67%) were aware about MDA activity. During interview people who were aware about MDA activities reported that source of information was health

staff, anganwadi workers, ASHA and mike announcements etc.

**Discussion**

The present study revealed that population covered by the drug distributor was 81.66% which is similar to a study conducted by Marathe N et al in Chhatarpur district of Madhya Pradesh where coverage rate was 78.84%.[8] Compared to our study, another study conducted by Chinte L T et al in Latur district of Maharashtra showed higher coverage rate of 95.5%. [9]In our study, significantly higher coverage rate (z score= 9.2645, p value = 0.0001) was found in rural villages (90.97%) as compared to urban areas (57.32%). Similar findings were observed by Godale L B in Osmanabad district of Maharashtra showed a significantly higher coverage rate in rural area as compared to urban area.[10] This might be due to the fact that drug distributor was a resident of the study villages in rural area and had a good rapport with the village people.

This study revealed that actual MDA compliance was 95.24%. Several other studies across India revealed varied compliance of MDA ranging from 38.8% to 81.15%.[10-15]

MDA should be implemented in more than 85% of the population in endemic areas and must be sustained for at least five years so that it will interrupt the transmission of filariasis.[3] However in this survey, the effective coverage rate was 77.78% which was lower than the standard target level. In our study, significantly higher effective coverage rates (z score= 9.732, p value = 0.00018) were observed in rural areas (88.29%) as compared to urban areas (50.31%). Similar findings were observed by Ghosh S et al where effective coverage rate was significantly lower in urban areas (87.4%) as compared to rural area (95.3%). [16] This is in contrary to study done by Bhatia M et al in Madhya Pradesh where effective coverage rate was significantly higher in urban areas (75.53%) as compared to rural area (65.65%).[13]

Coverage compliance gap is a better indicator to assess the effectiveness of MDA program. It actually reflect the proportion of people who do not consume the drug but drug is distributed to them and it gives the possible determinants for nonconsummation of drugs. The present study revealed a CCG of 4.76% (12.23% in urban and 2.95% in rural). Similar findings were observed by Ghosh S et al with CCG of 4 % and Perni S G et al with CCG of 6.52% (urban = 15.00% and rural = 5.09%).[17] However the study conducted by Marathe N et al found much higher CCG of 23.48% (urban = 24.35%, rural= 23.22%).[8] This difference might be due to different study settings. This can be improved by Behavioral Change Communication strategies to motivate people for drug consumption as well as on supervised dosage.

In this study, 62.79% population swallowed drug in presence of drug distributor which is lower as compared to study done by Chinte L T et al where 86.25% population swallowed drug in presence of drug distributor. Beneficiaries gave different reasons for not swallowing drug in presence of drug distributor like empty stomach at the time of visit, not available in home during their visit, side effect of drugs etc. [9] Study conducted by Godale L B et al found much lower (35.31%) consumption in presence of DD.[10]

Most common reason for non-compliance was drug was not delivered to the eligible population (82.50%) followed by forgot to take drug after drug was given by drug distributor (11.90%). Similar findings were found in study conducted by Ranganath T S et al where various explanations like not at home (62%), forgotten to take (15%), fear of reactions (13%) and not worth (10%) were the reasons for non-compliance.[18] Different studies gave different explanations for reason for non-compliance [9-17]

In this study, only 6 persons (1.38%) had mild adverse reactions like nausea, vomiting, mild fever etc after consuming DEC. Consistent results were reported by Jothula KY etal, Prasad V G et al found 1.14%, 1.81% of adverse effects after consuming DEC.[12],[19]

This study showed 86.67% households were aware regarding MDA activity from various

sources like ASHA, anganwadi workers, health workers, mike announcement etc. which is higher as compare to study done by Ranganath TS et al where only 55 % population were aware about MDA activity. [18] Awareness in rural was better as compared to urban area. So there is a challenge exist in urban areas. If the awareness will increase, it will definitely increase the compliance in MDA activity.

**Conclusion and Recommendations**

In spite of average coverage in Nagpur district, widespread rural-urban variation in performance status, lack of supervised drug dosing revealed by the present study is remain the important areas of concern. Both drug coverage and compliance needs to be improved. Stress to be given in urban area for better compliance. Drug distributor should ensure the coverage and in presence consumption of drug. IEC activity should be strengthen to increase the awareness regarding MDA, particularly in urban area.

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