How to Cite:
Agrawal, A. K., Meher, T. K., Bhue, P. K., Mohapatra, G., & Panda, M. (2022). Mass Drug Administration (MDA) in elimination of lymphatic filariasis: Assessment in Part of Eastern India: An original research. *International Journal of Health Sciences*, *6*(S9), 1721–1732.
https://doi.org/10.53730/ijhs.v6nS9.12746

Mass Drug Administration (MDA) in elimination of lymphatic filariasis: Assessment in Part of Eastern India: An original research

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***Abstract*---**Lymphatic filariasis, a group of parasitic infections which can lead to disfigurement, disability and chronic pain. It causes social stigma which adversely affects their social and economic life. For elimination of LF, mass drugs administration is being implemented since 2004 in Odisha. A cross-sectional study was conducted in Baragarh district in the month of April 2021. Data regarding MDA was collected from 300 (200 rural and 100 urban) households (HHs) in a pre-designed, pretested questionnaire. A total of 300 households were covered in the post MDA survey of Bargarh with 1412 individuals. Of them, 1367 (96.8%) were found to be eligible. Of those who received the drugs, compliance was 94.1%. Overall effective coverage of MDA was 82%. But the difference in compliance among the three studied clusters was not found to be significant. In all the age groups only 25% of the eligible persons had consumed the drugs in front of the DD (Effective Supervised coverage).Though the coverage and compliance

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
Manuscript submitted: 9 May 2022, Manuscript revised: 18 July 2022, Accepted for publication: 27 August 2022

were found to be better, the effective supervised coverage of MDA is still low. A good compliance along with effective supervised coverage should be the mainstay of the strategy for elimination of LF rather than the mere coverage of MDA.

Keywords---Lymphatic Filariasis, MDA, Coverage, Compliance, Effective Supervised Coverage

Introduction

Lymphatic Filariasis (LF) is one of the oldest and most debilitating neglected tropical diseases, commonly known as elephantiasis recognized by the World Health Organization (WHO) as a group of parasitic infections, which primarily affect people living in extreme poverty (National Lymphatic Filariasis Elimination Programme, 2021). LF is the world's second leading cause of long-term disability. The current estimate reveals that 120 million people in 83 countries of the world are infected with lymphatic filarial parasites and it is estimated that more than 1.1 billion (20% of the world's population) are at risk of acquiring infection. Over 40 million people are severely disfigured and disabled by filariasis and 76 million are apparently normal but have hidden internal damage to lymphatic and renal systems (Filariasis Control India, 2021). According to the World Health Organization, India, Indonesia, Nigeria and Bangladesh alone contribute about 70% of the infection worldwide (WHO). Indigenous lymphatic filariasis cases are reported from 20 States/UTs, from these States/UTs, a total of 250 districts have been identified to be endemic for filariasis with a population of about 600 million at risk (National vector borne disease control programme, 2021). Morbidity surveys (up to 2012) of filarial cases in the states/UTs revealed 8lacs cases of lymphedema and 4lacs cases of hydrocele. The mf survey reports received from 205 districts revealed mf rate of about 0.45% (Parks., 2017). As per available data in Odisha, 79,912 persons in the State are recorded to be suffering from lymphedema and 37,085 from hydrocele (Parks., 2017). Annual Mass Drug Administration (MDA) of single dose of DEC (Diethylcarbamazine citrate) and Albendazole for the eligible population (except pregnant women, children below 2 years of age and seriously ill persons) to interrupt transmission of the disease. India changed its strategy from delivery of DEC alone to delivery of DEC plus Albendazole. In spite of the awareness of the community regarding the MDA programme for elimination of LF by various strategies, a substantial proportion of community members do not consume the drug (Bhue et al., 2021). Hence assessment of MDA programme is being done by independent team members who are not directly connected with MDA programme. In Odisha, till 2014 coverage was more than 85%, except for 2012 when the survey was not done (Hussain et al., 2014). The objective of the present study is to estimate the coverage of MDA and to enlist the reasons for non-consumption of the drug in Bargarh district of Odisha situate in Eastern India.

Material & Methods

Study Design and Period

Post MDA coverage evaluation was conducted in Bargarh district using cross-sectional study design in the month of April 2021.

Study area and sampling techniques

As per the recommendation of Ministry of Health and Family welfare, Govt. of Odisha for the evaluation of MDA as a part of filariasis elimination programme, the present assessment was conducted in 4 clusters of Bargarh district (two rural and two urban). Taking the prevalence 71% by a study conducted by Bhatia et al., 2018 at 95% confidence interval with 2.5% margin of error, the sample size was calculated as 1266. As average family member per house hold is four, so it is decided to cover 300 households. Multistage random sampling was done to select the required number of households to be surveyed in both rural and urban areas.

A. Rural area

By simple random method, in the first stage, two blocks of Bargarh district were selected (Gaisilet and Ambabhona) and in second stage, two sub-centres per block were selected. In Gaisilet block two selected sub-centres were Sardhapali&Malmunda and in Ambabhona block the two sub-centres were Ambabhona&Bhainatora. Then five villages per sub-centre area were selected randomly in third stage (as shown in the fig.1). In fourth stage, from each village ten households were selected by systematic random sampling method.Thus a total of 200 households from rural area (10 HH/village * 5 Villages/sub-centre area * 2 Sub-centre areas/block * 2 Blocks/district) were included in the survey.

Households of the selected villages were the sampling units and in each selected households respondents were the adults present in the house. After reaching the centre of the village, one house was selected randomly. From that house every alternate house was selected, if the house was closed or no adults present in the house to respond, then the next house was selected till a total of 10 households were selected.

B. Urban area

Bargarh &Barpali towns were purposively selected and one ward in each town was selected randomly. In each ward of the urban area, the team visited the first crossroad in the main street and from there they randomly selected one street and continued to survey the households till they reached the 10th household. In this manner in the subsequent crossroads by selecting randomly one street, a total of 50 Households were visited. Thus in urban areas a total of 100 HH were surveyed i.e. fifty houses in each ward.

Study population

Study population included all eligible individuals residing in the households during the MDA distribution.

Study tools and techniques

A pre-designed, semi-structured schedule adopted from the recommended guidelines for conducting post-MDA assessment was used for data collection. The schedule contained information on age and sex distribution of the families. Also, information regarding drug distributions, absence/ presence of eligible family member during the same time, consumption, reasons for non-consumption of DEC & Albendazole tablets, side effects if any, treatment sought after the side effects, source of information on MDA programme and about drug distribution were included.

Method of data collection

With prior information to the district, the team reached the respective selected villages and wards assisted by the help from supervisors of the blocks. After reaching the household, the investigating team introduced themselves to the head of the household or any responsible adult person present in the house and explained them the purpose of the visit. With their consent, data was collected using the schedule by interview method. Participants who were unwilling to take part in the study were excluded.

Working definitions

Eligible population: All the people more than two years of age, not pregnant or not seriously ill are considered as eligible persons for consumption of medicines in MDA programme.
Drug Distributors: Drug Distributors (DD) were those who distributed drugs in the Community. They were ASHAs / MPW (F) accompanied by AWW and MPW (M).

Results

A total of 300 households were covered in the post MDA survey of Bargarh with 1412 individuals. Of them, 1367 (96.8%) were found to be eligible. Among the eligible, 710 (51.9%) were males and 657(48.1%) were females and 249(18.2%) were <15 years of age & 1118(81.8%) were ≥15 years of age. A total of 45 persons (3.2%) were not eligible for drug consumption. Of them, 36 (80.0%) were less than 2 years of age, 2(4.4%) were pregnant and 7(15.6%) were seriously ill.

In the surveyed area, drug was distributed for 1266 (92.6%) individuals out of 1367 eligible population and all had received the drugs at their homes. In Gaisilet block, of the total 465 eligible persons, 405 had received the drugs amounting to overall coverage of MDA as 87.1% (95% C.I. = 86.4%- 87.8%). Coverage in different age and sexgroups were as follows; persons ≥15 years of age (males- 88.4%, females- 88.4%) & persons <15 years age (females 88.6%, males 74.4%). Of those who received the drugs, compliance was 94.1%. Overall effective coverage of MDA was 82%. In all the age groups approximately 25% of the eligible persons had consumed the drugs in front of the DD (Effective Supervised coverage).

In the surveyed areas of Bargarh district though drug was distributed for 1266 individuals out of 1367 eligible population, 1212 had consumed the drugs. Hence Coverage, Compliance and effective coverage were 92.6% [**95% C.I.: 92.0%- 93.0%**], 95.7% **[95% C.I.: 95.4%- 96.0%]** and 88.7% [**95% C.I.: 88.0%- 89.4%] respectively.** But effective supervised coverage was only 52% **[95% C.I.: 48.8%- 55.2%]** (Tab. 1)**.**

Table 1: Comparison of Coverages and Compliance of MDA activity in 4 surveyed areas of Bargarh district

Indicators / Areas	Coverage (b/a*100)	Compliance (c/b*100)	Effective coverage c/a*100	Eff. Supervised coverage (d/a*100)
Gaisilet	87.1%	94.1%	82.0%	26.5%
Ambabhona	95.6%	96.5%	92.2%	56%
Bargarh Urban	95.6%	100%	95.6%	94.6%
Barpali Urban	95.2%	93.6%	89.1%	57.7%
Bargarh District	92.6% (95% C.I.: 92.0%- 93.0%)	95.7% (95% C.I.: 95.4%- 96.0%)	88.7% (95% C.I.: 88.0%- 89.4%)	52% (95% C.I.: 48.8%- 55.2%)

The **coverage** &**effective coverage** in Ambabhona, Bargarh and Barpali were significantly more than Gaisilet**[x^2= 31.3655, p< 0.05]** &**[x^2= 36.3871, p< 0.05]** respectively**.** But the **effective supervised coverage** of Bargarh, is significantly more than the other 3 blocks **[x^2= 276.0511, p< 0.05]** (Tab. 2)**.**

Table 2: Area wise comparison of Coverage, Effective coverage & Effective supervised coverage among Eligible population (n=1367)

Areas / Indicators	Gaisilet (n=465)	Ambabhona (n=450)	Bargarh Urban (n=204)	Barpali Urban (n=248)	Bargarh District (n=1367)	Test of Significance
Coverage						
Received drugs	405(87.1%)	430(95.6%)	195(95.6%)	236(95.2%)	1266(92.6%)	χ^2 = 31.3655 p< 0.05
Not received drugs	60(12.9%)	20(4.4%)	9(4.4%)	12(4.8%)	101(7.4%)	
Effective Coverage						
Consumed	381(81.9%)	415(92.2%)	195(95.6%)	221(89.1%)	1212(88.7%)	χ^2 = 36.3871
Not	84(18.1%)	35(7.8%)	9(4.4%)	27(10.9%)	155(12.3%)	

consumed						p< 0.05
Effective Supervised Coverage						
Consumed in front of DD	123(26.5%)	252(56%)	193(94.1%)	143(57.7%)	711(52%)	χ^2 = 276.0511 p< 0.05
Not consumed in front of DD	342(73.5%)	198(44%)	11(5.9%)	105(42.3%)	656(48%)	

Out of all the surveyed areas, the compliance in Bargarh town was 100% and this is statistically significant than other 3 areas **[x^2= 12.3827, p<0.05]. The compliance** was significantly more among females (97.5%) than the males (94.0%) in all the surveyed areas **[x^2= 9.4789, p<0.05].** No significant difference in **compliance** was found between persons <15yrs and ≥15 yrs aged eligible population **[x^2= 0.0612, p>0.05]** (Tab. 3).

Table 3: Age, Sex & Area wise comparison of Drug Compliance of MDA in Bargarh district

Area / Compliance	Gaisilet (n=405)	Ambabhona (n=430)	Bargarh urban (n=195)	Barpali urban (n=236)	Bargarh District (n=1266)	Test of Significance
Consumed	381 (94.1%)	415 (96.5%)	195 (100%)	221 (93.6%)	1212 (95.7%)	χ^2 = 12.3827 p<0.05
Not consumed	24 (5.9%)	15 (3.5%)	0 (0%)	15 (6.4%)	54 (4.3%)	
Sex wise Compliance						
Sex / Compliance	Male (n=655)		Female (n=611)		Total (n=1266)	Test of Significance
Consumed	616(94%)		596(97.5%)		1212(95.7%)	χ^2 = 9.4789 p<0.05
Not consumed	39(6%)		15(2.5%)		54(4.3%)	
Age wise Compliance						
Are(yrs) / Compliance	<15 (n=227)		≥15 (n=1039)		Total (n=1266)	Test of Significance
Consumed	218(96%)		994(95.7%)		1212(95.7%)	χ^2 = 0.0612 p>0.05
Not consumed	9(4%)		45(4.3%)		54(4.3%)	

As per the programme, all the eligible persons were supposed to take the drugs in front of the DD to achieve 100% Effective supervised Coverage. But 501(36.6%) had not consumed the drugs in front of the DD. Reasons were asked to the respondents regarding the same. In the three surveyed areas, majority {**Gaisilet [**164 (63.6%)], **Barpali** [69 (88.4%)] and **Ambabhona** [54 (33.1%)]} reported that they were advised by the DD to consume the drugs after taking lunch or dinner and preferably after dinner. But in contrast, in urban area of **Bargarh**, all except two eligible persons who were not at home at the time of drug distribution, had taken the drugs in front of DDs. Other reasons were, many members [147 (29.3%)] were in empty stomach during the drug distribution {Ambabhona [85 (52.2 %)], Gaisilet [61(23.6%)], and Barpali [1(1.3%)]}, absence of eligible family members [54 (10.8%)] during the visit of DD {Gaisilet [20(7.8%)], Ambabhona [24(14.7%)] and Barpali [8(10.3%)]} and fear of side effects among 13(5%) people in Gaisilet block (Tab. 4).

Table 4: Reasons for not consuming drugs in front of DDs by eligible population (n=1367)

Name of Area	Gaisilet N (%)	Ambabhona N (%)	Bargarh urban N (%)	Barpali urban N (%)	Bargarh District N (%)
Beneficiaries not Consumed Drugs in front of DDs	258(55.5%)	163(36.2%)	2(1%)	78(31.5%)	501(36.6%)
Reasons for non consumption of drugs in front of DDs					
In empty stomach during visit of DD	61(23.6%)	85(52.2%)	0(0%)	1(1.3%)	147(29.3%)
Absent at home during visit of DD	20(7.8%)	24(14.7%)	2(100%)	8(10.3%)	54(10.8%)
DDs advised to take drugs after dinner	164(63.6%)	54(33.1%)	0(0%)	69(88.4%)	287(57.3%)
Fear of side effects	13(5%)	0(0%)	0(0%)	0(0%)	13(2.6%)
Name of Area	Gaisilet N (%)	Ambabhona N (%)	Bargarh urban N (%)	Barpali urban N (%)	Bargarh District N (%)
Beneficiaries not Consumed Drugs in front of DDs	258(55.5%)	163(36.2%)	2(1%)	78(31.5%)	501(36.6%)
Reasons for non consumption of drugs in front of DDs					
In empty stomach during visit of DD	61(23.6%)	85(52.2%)	0(0%)	1(1.3%)	147(29.3%)
Absent at home	20(7.8%)	24(14.7%)	2(100%)	8(10.3%)	54(10.8%)

during visit of DD					
DDs advised to take drugs after dinner	164(63.6%)	54(33.1%)	0(0%)	69(88.4%)	287(57.3%)
Fear of side effects	13(5%)	0(0%)	0(0%)	0(0%)	13(2.6%)

In the Bargarh district, 155(11.3%) eligible persons had not consumed the drugs. Of them 54(4%) had received the drugs, but due to various reasons had not consumed. The reasons were as follows; fear of side effects (42.6%), concerned person were away from home (35.2%), forgot to take (7.4%), old age (5.5%), taking other medicine (3.7%), loose Albendazole tablets which the mother was afraid to give to her children who returned home late (3.7%) and one person had not taken medicine as he was not given any prior information on MDA.

Rest 101(7.4%) persons had not received the drugs which was more in Gaisilet block 60(59.4%). In Barpali 2(2%) old age persons were not given drugs by DD though old age without any illness was not a contraindication. Similarly, 6 (5.9%) children were not given drugs in Gaisilet block by the DD though they were >2 years of age. Forty-eight (47.5%) respondents, (28 from Gaisilet block, 15 from Ambabhona block & five from Barpali) had not received the drug as their houses were locked during the visit of the DDs and DDs had not given the drugs for absent members of the family 22(21.8%) in urban area of Bargarh 9 persons, Barpali 5, and in Ambabhona&Gaisilet block four persons each). In Baddunguripali village of Sardhapali sub-centre of Gaisilet block 21(20.8%) persons complained that the DDs had not visited their houses for drug distribution. On further enquiry, they responded that because of the stock out, the drug was not given (Table 5)

Table 5: Area wise Distributions of Reasons for not consuming drugs by Eligible population (n=1367)

Areas Variables	Gaisilet	Ambabhona	Bargarh Urban	Barpali Urban	Bargarh Distric
Drugs Received but not consumed	24(1.8%)	15(1.1%)	0(0%)	15(1.1%)	54(4%)
Reasons for Non-consumption of Drugs					
Old age	1	2	-	-	3(5.5%)
Forgot	-	3	-	1	4(7.4%)
Taking other medicines	1	1	-	-	2(3.7%)
Fear of side effects	13	4	-	6	23(42.6%)
No prior	-	-	-	1	1(1.8%)

information on MDA					
Concerned person was away from home residing elsewhere	7	5	-	7	19(35.2%)
Loose Albendazole Tablets	2	-	-	-	2(3.7%)
Drugs not Received	60(4.4%)	20(1.5%)	9(0.6%)	12(0.9%)	101(7.4%)
Reasons for Non-receipt of Drugs					
Old age	-	-	-	2	2(2.0%)
Young age	6	-	-	-	6(5.9%)
Handicap	1	1	-	-	2(2.0%)
DD didn't go	21	-	-	-	21(20.8%)
Concerned members not at home	4	4	9	5	22(21.8%)
None of the members at home	28	15	-	5	48(47.5%)

Among 1212 beneficiaries who had consumed the drugs, only 81(6.7%) persons complained of some side effects. Majorities were from Gaisilet block 45(55.6%) and Ambabhona block 21(25.9%). The main complaints were as follows: - reeling of head (3%), vomiting (1.4%), headache (1.1%), nausea (1%), followed by fever (0.7%) & loose motion (0.3%). But none of them attended any health care facility rather seven persons have contacted quack for treatment.

Regarding IEC activities 133(44.3%) HHs had received the information and among them, 104 (78.2%) had received the information within 3 days and rest had received the information more than 3 days before the drug distributions. Few 20(12%) respondents from those who had not received any prior information about MDA reported that they have received the drugs for COVID-19. regarding the source of information regarding MDA, for majority of HHs 84(47.2%), the source of information was ASHAs followed by AWW 74(41.Very few HHs had received information from ANM.

Discussion

To interrupt the transmission and elimination of LF coverage should be 65% among at risk population and compliance should be more than 85% in endemic areas for a period of 5 years in succession (Satapathy et al., 2016; WHO). The house hold wise coverage of DEC in this study is 92.6%, however in a study by

Roy et al.,(2013) coverage is much lower.However in another study conducted by Ranganath et al. the coverage is much higher (Ranganath et al., 2012). A similar pattern is also seen in some other studies (Babu et al., 2008; Kumar et al., 2009). The more sensitive indicator was compliance of MDA because this indicates the actual consumption of tablets by the beneficiaries than the coverage. The overall compliance of MDA in our study was 95.7 %. The population in the urban areas showed a proportionately better compliance than those in the rural area. More awareness with the urban population might have influenced them to consume the drugs. Studies conducted by Bhatia V et al, Kulkarni et al. and Roy et al. reported compliances of 77.7 %, 72.5 % and 70.07 % respectively (Bhatia et al., 2018; Kulkarni et al., 2018; Kumar et al., 2009) . But in a Nagpur based study, Banerjee et al. reported a very low compliance of 48.5 % (Banerjee et al., 2019). So far as the consumption of drugs is concerned, 11.3 % of the beneficiaries did not receive the drugs and 7.4 % did not consume even though they received the drugs. The beneficiaries not being at home during the drug distribution was the most common reason among those who did not receive the drugs at all. Among the beneficiaries who received the drugs but did not consume them, the fear of side effects from the drugs was a major cause as reported by them. To alleviate these fears and gain confidence of the beneficiaries, the DDs should have given them sufficient information about the disease and the purpose of consuming the drugs. In this study only side effects drug is observed in only 6.7% persons while another study conducted by Bhue et al., 2021 only 5.7 % of the beneficiaries who consumed the drugs complained of some side effects. Regarding IEC information ASHA is the major source in this study where as Satapathy et al. in another western district in 2015 reported AWWs were the main source of information followed by ASHAs.

Conclusion

Though the coverage and compliance were found to be better, the effective supervised coverage of MDA is still low. A good compliance along with effective supervised coverage should be the main stay of the strategy for elimination of LF rather than the mere coverage of MDA. To increase the coverage and effective coverage of MDA, drug distributors should be trained to instruct the eligible persons to take the drugs in front of them after taking food and not to advice beneficiaries to take the drug at night after dinner. This will improve the effective supervised coverage. Hence planning should be done accordingly to cover the population. After the end of distribution, mop up rounds should be done for two days to cover the left out. Appreciation of the well performing DDs in the district will act as a stimulus for them. Award to the well performing villages/blocks may ensure better community participation. IEC activities should be highly focused in the communities to alleviate fear of side effects.

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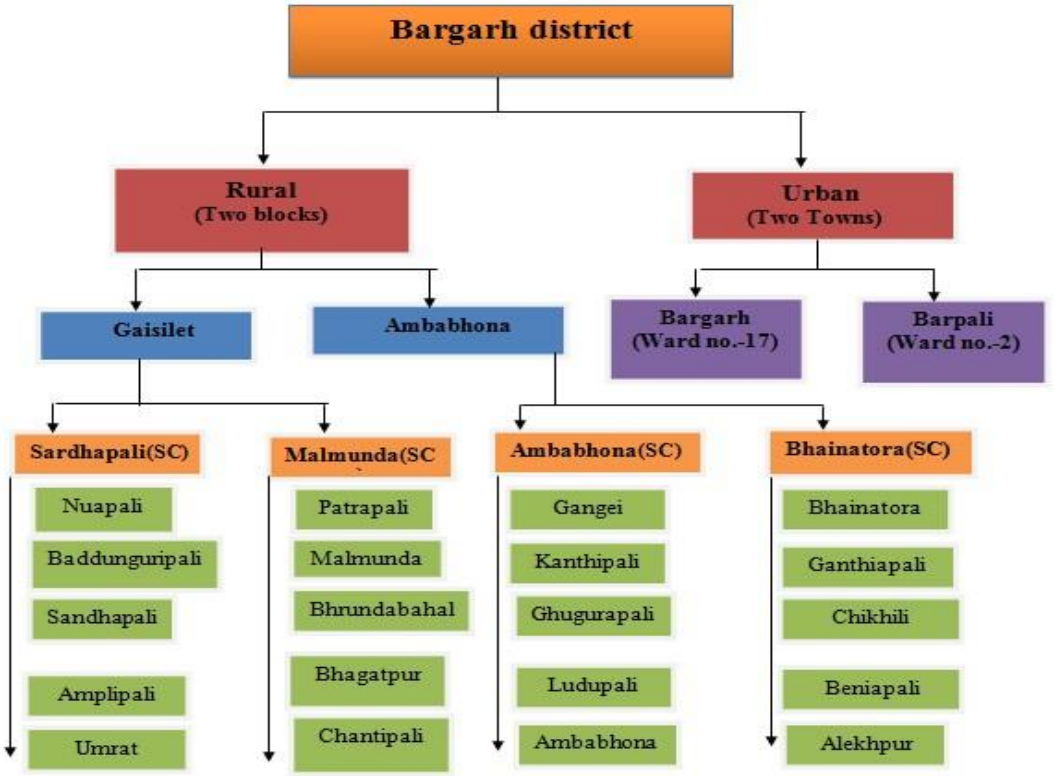

Figure I: Schematic diagram of Multistage Random Sampling for Post MDA assessment in Bargarh district