Biannual Mass Drug Administration with DEC in 2 Villages for 6 Years: Impact on Microfilaria Rate and in Children

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Abstract

A study in two villages of Ghatampur is undertaken using mass drug administration (MDA) with DEC+albendazol given to community members every 6 months and its impact on mf rate is monitored. It is found that except 76% MDA coverage at the time of baseline, it never reached 60% again. The impact on mf rate has been 81.1% after 5 years. The impact on mean mf counts has been 79.2%, 94.7% on mf range and some effect on new infection rate. Since MDA coverage has been an issue to realize its impact on mf rate, it is suggested that DEC-mediated salt could be an alternative strategy to eradicate infection in the community.

Keywords: Biannual MDA, Impact, mf rate, New infection

Introduction

Lymphatic filarial disease is caused by nematode worm, either Wuchereria bancrofti or Brugia malayia and transmitted by the mosquito species Culex quinquefasciatus and Mansonia annulifera/M. uniformis respectively. The disease manifests often in bizarre swelling of legs, hydrocele and breast, and is the cause of a great deal of social stigma. The disease in India is still endemic in about 255 districts spread over 21 Indian states. The disease control program strategy, currently covering a population of about 600 million, is based on two things – first to interrupt transmission using annual mass drug administration (MDA) with Diethyl-carbamazine citrate (DEC) (with/without Albendazol) for 5 years and to treat clinically diseased cases. With a view to explore a suitable strategy that can be effective to contain transmission among new susceptible living in the area in addition to its effect on current infection (mf) rate, an attempt is made to see the effect of 6 monthly mass drug administration (MDA) with DEC and albendazol, on clearing microfilaraemia infection in the community.

Materials and Methods

The study began in the year 2004 in two villages Narayanpur and Ayodhya Pur, with the first survey (baseline R0), repeated every 6 months and concluded in 2010. A volume of 20 μL blood sample was collected on a micro-slide in the late evening hours after 7 p.m. and processed to examine for mf, using standard procedures. MDA was given to all after the blood slide was taken. All the persons were asked to swallow the DEC and Albendazol tablets in the presence of the project team members. Therefore, the compliance was nearly 100% in those who had given blood samples for mf examination. If a slide reading showed 1 or more mf, this was labelled as positive, otherwise as negative. New infection rate is the mf rate found in persons examined in a round among those who were mf-negative in the previous round.

Results

Socio-demographic and Household Characteristics

The enumerated population of two villages was 1011 with...
51.4% males. Of the total, 37.5% had no education, 14.7% below primary (<5 years), 35.6% educated for 5–10 years and rest above this (>10 years) level. The use of mosquito net while sleeping was poor; 84.4% never used mosquito net, 14.5% used it irregularly and only 0.8% used it regularly. Of the total, 3.4% had filarial disease present at the time of the survey.

The household characteristics suggest that 24.6% were living in kaccha houses, 36.8% in semi-pucca and 38.6% in pucca houses. Almost half of the households did not have sufficient sun exposure (41.7% reported as very little, 9.4% as insufficient). Only 5.4% reported to have toilet within the house, 67.6% reported cross ventilation, 67.5% had at least one cattle within, 45% reported waterlogging in close proximity and 5.2% reported clean surrounding of their residence whereas 46.4% maintained clean house.

### Mass Drug Coverage and Microfilaria Rate

The mass drug coverage (MDA) was 76.6% at the initial baseline survey but thereafter it varied from 50% to 60% in various rounds.

At the time baseline (R0), the mf rate was observed to be 13.2% among 682 persons examined; it declined to 1.9% by the 4th round (R4), but increased again to 6.2% in 5th round and declined again to 2.3% by 8th round and reached 2.5% by 10th round (after 5 years). The mf rate decline was achieved to be 81.1% after 5 years using 6 monthly MDA in this population. The mean mf count per positive person was also observed to have declined by 79.2% during the 5-year period, whereas the range of mf count per positive declined by 94.7% from 264 to 14 (Table 1).

#### Table 1.Flarialometric Indices

| Rounds     | Smears Examined | mf Rate | Mean mf Counts per Positive (Median) | Mf Counts Range | New Infection Rate | MDA Coverage |
|------------|-----------------|---------|-------------------------------------|-----------------|--------------------|--------------|
| R0-Baseline| 682             | 13.2    | 26.0(12)                            | 254             | n/a                | 76.6         |
| R1         | 471             | 10.4    | 19.3(9.0)                           | 119             | 0.9                | 53.1         |
| R2         | 405             | 8.6     | 10.5(5.0)                           | 72              | 2.3                | 49.4         |
| R3         | 391             | 6.6     | 10.1(5.0)                           | 62              | 0.9                | 50.2         |
| R4         | 316             | 1.9     | 6.0(6.0)                            | 14              | 0.0                | 45.3         |
| R5         | 400             | 6.2     | 16.6(7.0)                           | 117             | 2.2                | 53.5         |
| R6         | 344             | 3.2     | 7.9(4.0)                            | 44              | 0.0                | 57.9         |
| R7         | 374             | 2.7     | 19.9(9.0)                           | 97              | 0.9                | 59.8         |
| R8         | 347             | 2.3     | 6.5(2.0)                            | 17              | 0.4                | 56.1         |
| R9         | 328             | 3.0     | 15.1(6.0)                           | 69              | 1.0                | 56.0         |
| R10        | 321             | 2.5     | 5.4(3.5)                            | 14              | 1.9                | 57.9         |
| Linear Decline (%) |        | 81.1    | 79.2                                | 94.7            | --                 |              |

The new infection rate was observed to be 0.9% after 6 months (R1) of baseline round, which increased to 2.3% in R2 and thereafter remained variable and at the 10th round, it was 1.9%.

#### Mf Rate among Children under 5 Years of Age

It is interesting to note that no infection is seen in children under 2 years of age all through the study duration whereas occasionally infection is found in children of 2–3 years and 4–5 years. Since the absence of infection did not show sustainability, it might have been due to artefact of small children population. The population cannot be said to be free from infection (Table 2).

#### Table 2.Mf Rate among Children under 5 years of Age

| Rounds     | N  | 0–1 | 2–3 | 4–5 | Total |
|------------|----|-----|-----|-----|-------|
| R0-Baseline| 74 | 0   | 4.3 | 2.7 | 2.7(2) |
| R1         | 43 | 0   | 22.2| 6.9 | 9.3(4) |
| R2         | 42 | 0   | 0   | 0   | 0     |
| R3         | 44 | 0   | 0   | 0   | 0     |
| R4         | 46 | 0   | 0   | 3.7 | 2.2(1) |
| R5         | 48 | 0   | 16.7| 3.2 | 6.2(3) |
| R6         | 50 | 0   | 0   | 0   | 0     |
| R7         | 62 | 0   | 0   | 0   | 0     |
| R8         | 64 | 0   | 0   | 0   | 0     |
| R9         | 59 | 0   | 0   | 0   | 0(0)  |
| R10        | 67 | 0   | 5.0 | 0   | 1.5(1) |
Discussion and Conclusion

The present study is an attempt to assess the impact on mf rate in 2 villages of Ghatampur in Kanpur district, treated with 6-monthly MDA (DEC+ALB) for 5 years. The study suggests that mf rate declined by 81.1% at the end of 5 years, mean mf count by 79.2% and mf count (range) by 94.7%. However, during the time, new infection among those infection-free in previous rounds, is observed to be 0 to 2.3%. This reveals clearly that transmission is not completely interrupted by mass drug administration during 5 years even after using it for every 6 months. However, infection in children under 5 years of age reveals the trend of infection (mf rate) approaching zero level. One of the main reason for this is low mass drug coverage – about 50%. Since another half of the population do not participate in taking antifilarial drugs, infection persists and defies the very purpose of MDA targeting community along with mosquito population.

Several studies had indicated that MDA coverage had been an issue to achieve significant decline in mf rate close to zero. It has been shown that with 10% mf rate (endemicity) in the population and 60% of MDA coverage, it would take about 10 years to see the infection levels touching 0.5%, beyond which infection is believed to be dying out naturally.\(^1\)

A study had shown that mf rate declined only by 17% among those who took MDA just once during 6-year course as compared to 88% among those who took MDA for all the 6 years.\(^2\) Another study indicated that if 12 days additional DEC is given to microfilaria-positive with routine MDA and coverage is assured to be 100%, mf rate could reach zero level by 4th year and then sustained at this level.\(^3\) This is what could be called eradication. Therefore, high coverage by MDA is the key factor to achieve elimination and later eradication of lymphatic filariasis in the community. However, this seems to be an uphill task and not really easy to achieve. The experience in exploring various treatment strategies suggests that the program should look beyond MDA program and DEC-medicated salt could be an option since it has advantages of continuity of intake in the community as a whole. Thus good coverage and effectiveness could help wipe out the infection.

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Conflict of Interest: None

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