Greater Adherence to Mass Drug Administration Against Lymphatic Filariasis through Traditional Village Forums in Fiji

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Abstract

Objective: The aim of this study was to elucidate the roles of knowledge related to lymphatic filariasis (LF), contributions of taking roles in community activities to eradicate LF and participation in traditional village forums in adherence to mass drug administration (MDA) in a preventive chemotherapy program targeted at the community residents.

Materials and Methods: A survey on ingestion of diethylcarbamazine (DEC) and albendazole (ALB), knowledge related to LF, taking roles in community activities and participation in traditional village forums was carried out for 400 adult subjects randomly selected from the Central Division of Fiji within three months after the MDA campaign in 2010 in the respective communities. Multi-level logistic regression analysis and multilevel linear regression analysis were performed to examine relationships between knowledge, community activities, traditional village forums and ingestion of anti-filarial drugs. The LF knowledge score was defined as a factor score of five knowledge variables.

Results: Among 324 respondents, 40.4% of them ingested both DEC and ALB. Participation in traditional village forums was independently and significantly related to ingestion of DEC and ALB (OR=1.78, 95% CI=1.04–3.05) and taking roles in community activities for MDA (OR=1.87, 95% CI=1.18–2.94), regardless of the subject’s gender, education, knowledge and taking roles in community activities. Taking roles in community activities for MDA was independently related to the LF knowledge score (β=0.24, 95% CI=0.15–0.33).

Conclusion: Participation in traditional village forums in Fiji was related to taking roles in community activities for MDA and associated with adherence to MDA regimen regardless of the educational attainment of the individual residents.

Key words: adherence, lymphatic filariasis, mass drug administration, traditional village forums

Introduction

Lymphatic filariasis (LF) is a neglected tropical disease that causes deformity and is estimated to infect 120 million people in 81 countries globally. The estimated population in LF endemic areas is reported to be 1.34 billion1. In Fiji, an island nation in the South Pacific with a population of 843,000, LF has been an important public health problem as in other LF endemic countries. The elimination of LF is one of the country’s millennium development goals earmarked to be achieved by 2015.

Despite the introduction of a globally recommended mass drug administration (MDA) program in Fiji in 2002, the national prevalence of antigenemia of LF was still 9.5% in 2007 as compared with 16.6% in 2001; less than 1.0% is the recommended level of achievement. The effectiveness of MDA-based programs depends on understanding of the relevant perceptions and practices of the people in the relevant communities for positive behavior change to be adherent to the provided regimen of preventive chemotherapy, vector control and morbidity management.

The Global Programme to Eliminate Lymphatic Filariasis (GPELF), established in 2000, was the first and largest global program based on MDA and has the goal of eliminating LF as a public health problem worldwide by 20202. This followed a recommendation by the International Task Force for Disease Eradication indicating that it is potentially eradicable3 based on knowledge of the effectiveness of combined annual chemotherapy4,5.

The GPELF recommends pursuit of mass treatment in
the settings where the prevalence of antigenemia is more than 1%\(^4\). Elimination of LF using MDA will require an efficient drug distribution system and high adherence by the population for an extended period of time because estimates of the lifespan of *Wuchereria bancrofti* adult filarial worms\(^6\).

The recommended mass treatment strategy is a singledose, two-drug regimen of albendazole (ALB) with either diethylcarbamazine (DEC) or ivermectin to be used by communities at risk with the goal of reaching microfilaria clearance with an adherence rate of at least 70% for 4–6 years\(^7\). The two-drug combination of DEC and ALB has been recommended for *Wuchereria bancrofti* endemic populations in areas without *Onchocerca volvulus* like those of the Pacific region. The combined drug effect eliminates 99% of the microfilaria for one year compared with the effect of DEC alone, which eliminates 90% of microfilaria for a year\(^8\).

LF has been one of the most studied diseases in Fiji’s history, with its first documented microfilaria prevalence rate being 27.6% in 1925\(^9\). The prevalence rates of microfilaria and antigenemia in the Fiji Islands before applying the new regimen of MDA were reported to be 6.8% for microfilaria prevalence tested by a microfilaria test and 15.2% for prevalence of antigenemia tested by the immunochromatographic (ICT) filariasis card test.

The country subsequently joined the MDA campaign for the Pacific in 2002 with the recommended drugs of DEC (6 mg/kg) and ALB (400 mg; GlaxoSmithKline, Brentford, UK) coadministered annually in every village and settlement to persons of 2 years of age or older, excluding pregnant women and those too weak to ingest the drugs.

Traditionally, a village in the Fiji context is a registered settlement for indigenous communities. These villages have a community structure and are led by traditional heads who run traditional village forums to carry out the affairs of the community. Through the community activities, members are able to reflect on their own experiences and review their own decisions with others. Information is shared by this openly communal and organized structure. The way of problem solving in the traditional manner, which is culturally acceptable for these indigenous communities, is sought by community members.

We postulate that village structures and roles within a community have a workable attachment to every household that can be explored for mass eradication of LF. Through traditional village forums and following community activities to promote MDA programs, members are able to participate and involve themselves as a way of increasing their awareness about the issue at hand. It also helps them in their drug ingestion choices because they directly access proper information first hand through the forums and then provide the necessary information for participation to their households as a rational decision and not based merely on persuasion.

The objective of this study was to elucidate the roles of knowledge related to LF, contributions of taking roles in community activities to eradicate LF and participation in traditional village forums in adherence to MDA regimen.

**Methods**

A survey was conducted in September and October 2010 in the Rewa Subdivision of the Central Division, Fiji, the subdivision with the highest antigenemia according to the ICT test, 26.0% in 2004 and 15.4% in 2007, among the 4 divisions in the country. This study conducted a survey in 8 villages in the Rewa Subdivision out of 32 villages, which had been previously randomly selected by the Fiji Ministry of Health in 2002 as filarial prevention monitoring sites. In these villages, MDA programs had been conducted since 2002.

The subjects of our survey were adult males or females representing individual households. The population of adults in the Rewa Subdivision was 31,999 as of January 2010. By applying a sampling error of 5% and a sampling proportion of 50%, we selected 400 households as subjects for this study.

The survey was carried out in the villages from September to October 2010, within three months after implementation of the MDA campaign in the targeted villages. All participants in the survey consented to be interviewed in their own home or at common village halls. Interviews were conducted by 15 trained interviewers. Interviews were carried out at convenient times and places for the respondents.

A structured questionnaire form was developed in English, it was translated into the Fijian dialect used in the subdivision for interviewers as well as responding village residents, and then back translation was performed. The questionnaire was pretested in the same subdivision area of the study. Interviewers helped respondents to appropriately understand the meanings of questions according to the guidelines for interviewers.

The following information was collected: demographic characteristics, socioeconomic status, ingestion of DEC and ALB, knowledge related to LF, taking roles in community activities and participation in traditional village forums to discuss about MDA. Responses to questions about ingestion of DEC and ALB were reviewed to ensure consistency with the individual personal records of the MDA program filled out by health professionals. The subjects who ingested both DEC and ALB were regarded as adherent to the MDA preventive chemotherapy regimen.
We examined LF knowledge by using a principal component analysis of five variables of knowledge related to LF. The LF knowledge-related variables were symptoms of LF, causative agents of LF, prevention of LF, benefits of drugs and side effects of drugs. The score was defined as the first principal component of the five knowledge variables.

The means of LF knowledge score according to ingestion of DEC and ALB, gender, education, taking roles in community activities and participation in traditional village forums were calculated, and statistical differences were tested by the t-test.

The percentage of subjects who ingested DEC and ALB in the past 3 months according to demographic factors, educational attainment, knowledge related to LF, taking roles in community activities and participation in traditional village forums were calculated. Statistical differences in the percentages were tested by the chi-square test.

We performed multilevel logistic regression analysis to examine relationships between knowledge, taking roles in community activities, participation in traditional village forums and ingestion of anti-filarial drugs by accounting for the intraclass correlation of the observations within villages. To examine the association between LF knowledge score and education, taking roles in community activities and participation in traditional village forums, multilevel linear regression was applied. To examine the association between taking roles in community activities and education, LF knowledge score and participation in traditional village forums, multilevel logistic regression was applied.

Statistical analysis was carried out by using PASW Statistics 18 (SPSS Inc., Chicago, IL, USA). We used a significance level of α=0.05.

The study protocol was endorsed and approved by the Fiji National Ethics Committee and an institutional review board of Tokyo Medical and Dental University.

**Results**

Among the 400 villagers approached, 324 responded, providing a response rate of 81%. Among the respondents, 131 (40.4%) had taken both DEC and ALB in the past 3 months.

Table 1 shows the percentages of subjects who ingested DEC and ALB in the past 3 months by gender, educational attainment, knowledge related to LF, taking roles in community activities and participation in traditional village forums. The percentage of the subjects having ingested both DEC and ALB was significantly higher among the subjects who had a proper understanding of the causative agents of LF (p=0.03) and side effects of the drugs (p<0.01) and among the subjects who attended traditional village forums (p<0.01).

Table 2 shows the factor loading of 5 knowledge variables for the first principal component obtained by principal component analysis. The LF knowledge score is a factor score of this component, and it was calculated by using these factor loadings. This first component factor accounted for 49% of the entire variances. All variables consistently showed positive factor loadings on the LF knowledge score.

The LF knowledge score was higher among villagers who ingested both DEC and ALB (mean=0.18; standard deviation=0.87) than among villagers who had taken only one or neither of the two drugs (mean=−0.12; standard deviation=1.06) (p<0.01).

Table 3 shows the independent relationships between the proportion of subjects who ingested DEC and ALB in the past 3 months and gender, education, the LF knowledge score, taking roles in community activities for MDA and participation in traditional village forums.
participation in traditional village forums for MDA shown by multilevel logistic regression analysis. The odds of ingestion of both DEC and ALB were higher among the subjects who participated in traditional village forums (p=0.04).

Table 4 shows the LF knowledge score by education, taking roles in community activities for MDA and participation in traditional village forums (n=324). Table 5 shows the independent relationships between the LF knowledge score and gender, education, taking roles in community activities for MDA and participation in village health forums for MDA in the past year shown by multilevel logistic regression analysis. The odds of ingestion of both DEC and ALB were higher among the subjects who participated in traditional village forums (p=0.04).

| Gender | N  | Mean | Standard deviation | p   |
|--------|----|------|--------------------|-----|
| Male   | 199| -0.46| (1.03)             | 0.28|
| Female | 125| 0.73 | (0.94)             |     |

| Educational attainment | N  | Mean | Standard deviation | p   |
|------------------------|----|------|--------------------|-----|
| Primary                | 79 | 0.23 | (0.76)             | 0.05|
| Secondary              | 214| -0.05| (1.02)             |     |
| Tertiary or above      | 31 | -0.20| (1.30)             |     |

| Community activities for MDA | N  | Mean | Standard deviation | p   |
|-------------------------------|----|------|--------------------|-----|
| Yes                           | 106| 0.15 | (0.77)             | 0.03|
| No                            | 218| -0.74| (1.09)             |     |

| Traditional village forums | N  | Mean | Standard deviation | p   |
|----------------------------|----|------|--------------------|-----|
| Yes                        | 199| 0.03 | (0.93)             | 0.45|
| No                         | 125| -0.55| (1.10)             |     |

| Gender | LF knowledge score | β   | (95% CI) | p   |
|--------|--------------------|-----|----------|-----|
| Male   | Reference          |     |          |     |
| Female | 0.14 (-0.14, 0.42) | 0.49|

| Educational attainment | LF knowledge score | β   | (95% CI) | p   |
|------------------------|--------------------|-----|----------|-----|
| Primary                | Reference          |     |          |     |
| Secondary              | -0.29 (-0.50, -0.08) | <0.01|
| Tertiary or above      | -0.43 (-0.95, 0.10) | 0.10|

| Community activities for MDA | LF knowledge score | β   | (95% CI) | p   |
|-------------------------------|--------------------|-----|----------|-----|
| Yes                           | Reference          |     |          |     |
| No                            | 0.24 (0.15, 0.33) | <0.001|

| Traditional village forums | LF knowledge score | β   | (95% CI) | p   |
|----------------------------|--------------------|-----|----------|-----|
| Yes                        | Reference          |     |          |     |
| No                         | 0.04 (-0.22, 0.29) | 0.78|

LF, lymphatic filariasis; OR, odds ratio; CI, confidence interval. Results of multilevel logistic regression analysis. Name of villages where individual subjects lived were used as a control variable.
level linear regression analysis. The LF knowledge score was significantly lower among the subjects who completed secondary school than in the subjects completed who only primary school (p<0.01) and was higher among the subjects who took roles in community activities for MDA than for others (p<0.01).

Table 6 shows the independent relationships between taking roles in community activities for MDA and education, knowledge and participation in traditional village forums (n=324)

| Taking roles in community activities for MDA | OR (95% CI) | p   |
|---------------------------------------------|------------|-----|
| Gender                                      |            |     |
| Male Reference                             |            |     |
| Female                                     | 0.68       | (0.48, 0.96) | 0.03 |
| Educational attainment                     |            |     |
| Primary Reference                          |            |     |
| Secondary                                  | 1.08       | (0.76, 1.53) | 0.68 |
| Tertiary or above                          | 1.72       | (1.29, 2.28) | <0.01|
| LF knowledge score                         | 1.33       | (1.16, 1.52) | <0.01|
| Traditional village forums                  |            |     |
| Yes                                        | 1.87       | (1.18, 2.94) | <0.01|
| No                                         | Reference  |     |

LF, lymphatic filariasis; MDA, mass drug administration; OR, odds ratio; CI, confidence interval. Results of multilevel logistic regression analysis. Name of villages where individual subjects lived were used as a control variable.

Discussion

Summary of findings

A survey to examine adherence to an annual single-dose combined chemotherapy for eradication of LF in Fiji by the community residents revealed 40.4% adherence in adult males and females to the given regimen. Participation in traditional village forums was independently and significantly related to ingestion of DEC and ALB, regardless of the subjects’ gender, education, knowledge, and taking roles in community activities for MDA. Taking roles in community activities for MDA was independently related to the LF knowledge score. Participation in traditional village forums by community members was related to adherence to the MDA program’s prescribed regimen regardless of educational attainment of the individual residents. The roles of traditional village forums and residents’ participation in community activities to support implementing MDA programs were elucidated.

Adherence

Regarding the 80 countries known to be endemic for LF, information about adherence to MDA regimens is only available for 11 countries: Brazil, French Polynesia, Ghana, India, Kenya, Malaysia, Nigeria, Papua New Guinea, the Philippines, Thailand and the United Republic of Tanzania.

This study from Fiji showed only 40.4% adherence among adult males and females. It is short of being a satisfactory level for expected eradication of the disease, which requires an adherence rate of at least 70%. The findings add to the challenge of successfully implementing MDA programs, which need to consider the perceptions and understanding of the receiving population to ensure successful eradication of the disease and to sustain elimination of the disease.

Low adherence rates were also reported in Kerala, India, where the adherence rate observed had been (39.6%) in a cross-sectional survey of 599 persons. The adherence rates in the year 2002 when the program was first implemented in India, ranged from 38.8% to 78.8%. Another survey in Orrisa, India, in 2004, reported 46.0% in the population surveyed had consumed the drugs.

Gender

Adherence to the MDA regimen in females was slightly greater than in males. This result is understood in relation to women taking greater roles in family health in Fiji’s context. In some societies, for instance in Papua New Guinea (PNG), the MDA program heavily depend on the authority of its elders which is dominated by males. Contrary to this study in PNG, our results were regarded as a good sign for the potential to promote understanding of LF and its prevention by engaging women in leadership roles.

Educational attainment

Individuals with the lowest educational attainment (i.e., primary school graduates) showed the highest adherence to the MDA regimen. Consistent with findings on educational attainment and adherence to other medical treatments, the relationship between adherence to the MDA regimen and educational attainment of individuals was not significant in our study. Factors facilitating practices and behavior
related to receipt of treatment were considered to be more potent for adherence to the MDA regimen among the majority of subjects who completed their basic education.

Knowledge and beliefs related to LF

In this study, more people who ingested DEC and ALB tablets had good knowledge of LF. Knowledge of the symptoms of LF was not significantly associated with adherence to ingestion of the drugs. This could be better described by the concept of the “endemic normal” being unaware of their chance of being at risk of infection as earlier explained above.12

Perception of the disease

Beliefs about disease causality and transmission were thoroughly discussed in a review by Wynd15) and confirm that little information has been formally collected about how communities incorporate LF, its origins and impact, into local knowledge systems. The role of mosquitoes in transmitting the parasitic agents of filariasis is poorly appreciated in many endemic communities; hence, there is little awareness in these areas of the importance of minimizing mosquito contact for preventing infection.10

For instance, in a Malaysian study, only nine of 108 respondents associated filariasis with mosquitoes, while walking barefoot on dirty ground and consuming contaminated foods or drinks were thought to be associated with infection.17) In rural Thailand, while school children indicated correctly that mosquitoes transmit filariasis and that the disease could be prevented by personal protection against mosquito bites, adults maintained that the disease was inherited or resulted from poor blood circulation, carrying heavy loads, prolonged standing, bathing in or drinking swamp water, personal contact with infected individuals or sorcery.19) These and similar stories ensued in Papua New Guinea, the United Republic of Tanzania, French Polynesia and the Philippines and highlight the lack of appropriate behavior in prevention and protection against the disease as a result of poor perceptions. In our study, the knowledge level was similarly poor in Fiji and identifying factors that facilitate ingestion of the MDA regimen was prioritized. Adherence by targeted endemic populations is absolutely necessary. This has been pointed earlier by Dunn, who indicated that the gap between biological knowledge of the disease and indigenous perception of the disease has to be explored to ensure acceptance of the MDA drugs and the program by the people in order to produce a positive behavior change in support of eradication of the disease.

MDA community activities

Through community activities, members are able to reflect on their own experiences and review their own decisions with others. This is the structure of information sharing that best suits a traditional community that is openly communal and organized. Problem solving in the traditional manner is culturally acceptable for these indigenous communities. The people get to organize and share information for wider participation from their common understanding and knowledge about the MDA program, the drugs and the disease.

Gyapong24) found that community-directed MDA programs achieved much higher levels of coverage than those delivered exclusively through the formal health sector and were especially effective in areas where health facilities were limited. Rifkin25) has argued that community involvement is more effective when viewed as an ongoing process. Improved coverage in the Ghanaian context was explained as resulting from a two-step process. First, the community was more likely to “own” the process because it was involved in directing it and, as a result, was more likely to participate and encourage participation by all community members, and it is possible that this sense of ownership may override or soften resistance to outside intervention. Secondly, the iterative approach to seeking permission, returning to train local treatment coordinators and ultimately delivering medication resulted in a higher overall level of understanding of the program’s purpose.

Traditional village forums

The majority of respondents confirmed that they were encouraged by traditional village forums to cooperate with MDA community activities in the village. Nevertheless, most respondents agreed that the venue of the traditional village forum generally gave them a great deal of information about the MDA program. This gives us a peek into how community ownership of treatment programs such as the MDA program should be reviewed.

This is the strength of this study, and it should be widely acknowledged that the traditional village forum provides an effective avenue to spread knowledge about MDA programs in local communities and can be utilized in other settings where such protocols exist and people are comfortable and familiar with it.

Sociocultural understandings of affected community groups are pivotal in achieving sustainability, local participation and ownership. Knowledge and dissemination of information in traditional village forums were better predictors of ingestion of the DEC and ALB in the community. Efforts to interrupt transmission and eliminate LF as a public health problem will certainly depend on effective mass chemotherapy campaigns and other public health strategies, including vector control where appropriate.
Fiji’s context

This study is important to the people of Fiji who are at risk of contracting LF and more appropriately to other regions where the disease may still be endemic and that are going through the same political upheaval and MDA situation as Fiji\(^9\). LF is a huge burden placing those infected or disabled by it in poverty and dependence because of their incapacitated condition and subjecting them to social stigma that is second only to malaria, which is the most common disease spread by mosquitoes\(^9\).

During Fiji’s darkest hour of political disturbance, this MDA program survived the political upheaval with the support and cooperation of grassroots supporters in their various forums and organized activities, despite the turmoil. It is necessary to highlight the fact that traditional village forums and activities sustained MDA activity at the local level and were not affected by national disturbances.

Conclusion

Participation in village health forums was related to taking roles in community activities for MDA and associated with adherence to MDA regimen regardless of the educational attainment of individual residents. Greater adherence to mass drug administration was achieved through the use of village health forums in Fiji to share information about lymphatic filariasis and by individuals taking roles in community activities regardless of educational attainment.

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