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The Need of Adequate Information to Achieve Total Compliance of Mass Drug Administration in Pekalongan

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Abstract. World Health Organization (WHO) initiated The Global Program to Eliminate Lymphatic Filariasis (LF) through mass drug administration (MDA). Pekalongan started MDA in 2011. Yet the LF prevalence in 2015 remained exceed the threshold (1%). This study aimed to describe the inhibiting factors related to the compliance of MDA in community level. This was a rapid survey with cross sectional approach. A two-stages random sampling was used in this study. In the first stage, 25 clusters were randomly selected from 27 villages with proportionate to population size (PPS) methods (C-Survey). In the second stage, 10 subjects were randomly selected from each cluster. Subject consisted of 250 respondents from 25 selected clusters. Variables consisted of MDA coverage, practice of taking medication during MDA, enabling and inhibiting factors to MDA in community level. The results showed most respondents had poor knowledge on filariasis, which influence awareness of the disease. Health-illness perception, did not receive the drugs, lactation, side effect, and size of the drugs were dominant factors of non-compliance to MDA. MDA information and community empowerment were needed to improve MDA coverage. Further study to explore the appropriate model of socialization will support the success of MDA program

Keywords: filariasis, mass drug administration, compliance, side effect, health-illness perception

1. Introduction

Lymphatic filariasis (LF) is a chronic infectious disease caused by *Wuchereria Bancroft*, *Brugia malayi*, or *Brugia timori*, and transmitted by mosquito vectors [1–4]. The disease rarely causes mortality, but the effect varies from acute symptom (adenolymphangitis, recurrent fever), chronic symptom (lymphedema, hydrocele, chyluria) [2–4], to disability [2,4,5]. World Health Organization (WHO)



8 estimated 1.4 billion people in 73 countries were at risk of LF in 2014. More than 120 million people have been infected globally with 40 million disabilities, consisted of 15 million lymphedema and 25 million hydrocele/chyluria [6]. Around 62 % cases were in Southeast Asia [7]. In Indonesia, 233 out of 404 districts (46 %) were endemic area of LF [8].

WHO launched The Global Program of Elimination of Lymphatic Filariasis (GPELF) as a Public Health Problem by the Year 2020 [9]. In accordance with The GPELF, Indonesia set Filariasis Elimination Program as national priority since 2005. The strategy for elimination is based on the WHO-recommended of applying annual single-dose mass chemotherapy, which is known as mass drug administration (MDA). MDA is addressed to the entire endemic communities [10].

Diethylcarbamazine citrate (DEC) is the drug of choice for MDA program. DEC may decrease microfilariae rate and LF transmission. However, DEC does not have macrofilaricidal effect [11]. Therefore, MDA should be continuously performed according to the duration of reproductive lifespan of the adult worm. A 5-years of MDA is believed to be sufficient to prevent filarial transmission by eliminating microfilariae in the blood of infected people [10]. Continuous MDA requires compliance of community in taking DEC appropriately. MDA is successful if the coverage reached at least 65 % annually. Maintaining the high coverage of MDA in several years is a challenge, especially in area with limited resources [12].

Pekalongan is a filariasis endemic area. The city started partial MDA in 2010. Finger blood survey in 2010 showed six villages with microfilariae rate (mf rate) more than 1 %, i.e. Bumirejo Village (5.54 %), Tegalrejo Village (2.39 %), Pabean Village (3.39 %), Bandengan Village (2.39%), and Kertoharjo Village (4.18 %). Pekalongan started simultaneous annual MDA throughout all areas since 2011. In April-June 2015, Pekalongan carried the last round of MDA. However, the coverage of MDA has not yet been determined. This study aimed to figure out the coverage of MDA in Pekalongan, and to determine the inhibiting factors of community compliance to MDA.

2. Materials and Methods

2.1. Study design and location

This was a rapid survey with cross sectional design to describe the coverage of MDA and its inhibiting factors. The study was conducted on July-August 2015 in Pekalongan City as an endemic area of LF. Study site was divided into clusters, which was located in villages. The selected villages were Bandengan (1 cluster), Banyuurip Ageng (3 clusters), Degayu (1 cluster), Jenggot (1 cluster), Karangmalang (1 cluster), Klego (3 clusters), Kramatsari (1 cluster), Krapyak (3 clusters), Kuripan Lor (2 clusters), Panjangbaru (1 cluster), Pringrejo (2 clusters), Sampangan (1 cluster), Kebulen (1 cluster), Tirta (3 clusters), and Yosorejo (1 cluster).

2.2. Study subject

Study population was people living in areas which received MDA program. The subject was family member of selected house, who was aged ≥ 15 years old. We selected 10 subjects in each cluster, therefore total subject was 250 people.

2.3. Sampling technique

We used two stage random method. In the first stage we used cluster sampling with a probability proportionate to size (PPS) method according to the number of population in each village. This study had precise level ± 10 % and confidence interval 95 %. In this stage we obtained 25 clusters from 15 villages by C-Survey software. In the second stage, we selected 10 houses from each cluster using simple random sampling method. The total houses selected were 250 houses.

Village map and random table were used to determine the location of the first house. Next houses were selected based on the nearest main door from previous selected house, and willingness of its host to participate in the study.

2.4. Variables

Variables in this study consisted of the practice of taking medication during MDA, factors affecting compliance of MDA, inhibiting factors of MDA in community level, knowledge related to LF (cause, transmission, prevention, medication), information on MDA, information media that reached respondents (interpersonal, non-interpersonal).

Support of elimination officers was defined as the role of cadres or health workers in disseminating information on MDA prior to the MDA program implementation, and their role during the implementation. Inhibiting factor was defined as the obstacles faced by community and officers in the execution of MDA. MDA coverage was measured by the proportion of respondents who complied in taking medicine during MDA implementation divided by the total number of respondents received drug, and expressed in percentage.

2.5. Data analysis

Data was analyzed to describe the coverage of MDA and to identify enabling and inhibiting factors related to community acceptance toward MDA.

3. Result and Discussion

Regarding compliance with MDA, our study reported 72.8% compliance after the fifth round of MDA (Table 3). This value was higher than national rate (65.9%) in 2015, yet lower than the expected coverage rate of MDA (85.0%). Compared to other regions in Indonesia, this result was lower than Tabalong District (85.8%) and Hulu Sungai Utara (90.9%) in Kalimantan [13], Bandung District (78.0%) in West Java [14]. This finding may be the explanation why Pekalongan did not pass the pre-TAS assessment. Transmission assessment survey, abbreviated to TAS, is an activity to assess whether a series of MDA have successfully reduced the prevalence of infection to levels equal to or below the critical cut-off threshold for the various vector species and complexes, and to decide whether MDA can be stopped [15].

Many countries are now scaling down MDA activities after reaching 100% geographic coverage and instituting monitoring and evaluation processes to establish the impact of several rounds of MDA and determine that transmission had been interrupted. At the same time, countries that are yet to initiate MDA for LF elimination will adopt improved mapping and coverage assessment protocols to accelerate the efforts for achieving global elimination. This review provides an update on treatment for LF and describes the current global status of the elimination efforts, transmission control strategies, importance of determining the impact of MDA and the role of surveillance after MDA has been stopped [16].

3.1. Characteristics of subject

Table 1 shows proportion of subject decreased with age, but the proportion of non-compliance tended to increase with age, although no significant difference was found ($p=0.069$). Almost a quarter of subjects were female. Our result was in accordance with previous studies on MDA evaluation that most of respondent [17,18]. Men usually work at noon so more women were to be found during interview.

Table 1. Characteristics of subjects

Characteristics	Total (n=250)	Compliance (n=182)	Non-compliance (n=68)	p-value
Age				
- 15-30	31.2	62.8	37.2	0.069
- 31-45	37.6	79.8	20.2	
- 46-60	26.8	76.1	23.9	
- 61-75	4.4	63.6	36.4	
Sex				
- Male	26,0	83.1	17.9	0.030
- Female	74,0	69.2	30.8	
Education				
- Not attending school	14,0	65.7	34.3	0.793
- Elementary school	34,4	73.3	26.7	
- Junior high school	24,0	73.3	26.7	
- Senior high school	22,8	77.2	22.8	
- Academy/University	4,8	66.7	33.3	
Occupation				
- No occupation	2,8	28.6	71.4	0.007
- Student	2,8	42.9	57.1	
- Housewife	42,0	64.8	35.2	
- Retired	0,4	100.0	0.0	
- Government employee	1,2	100.0	0.0	
- Privat employee	5,2	93.3	7.7	
- Merchant	10,0	88.0	22.0	
- Labour	20,4	80.4	19.6	
- Entrepreneur	8,8	81.8	18.2	
- Others	6,4	75.0	25.0	
Maritas status				
- Single	15,2	73.7	26.3	0.045
- Married	80,0	74.5	25.5	
- Spouse deceased	4,8	41.7	58.3	

Proportion of non-compliance female was higher than male. There were significant difference of non-compliance to MDA between male and female in this study ($p=0.030$). This finding is consistent with results from Egypt [19], India [20,21], and Kenya [22], although in contrary with several previous studies [18,23]. This could be due to higher literacy level among males as compared to females, which affected exposure to the information regarding to LF. Proportion of males in our study with good knowledge of LF was higher than females. This finding is consistent with results from a study in India that found that males were better informed about the disease and its mode of transmission [24]. In this study, almost half of subjects were housewives, and one third had basic education. Subject without occupation and student are the two highest non-compliance groups. Their status is affecting lack of information regarding to LF and MDA.

3.2. Knowledge of lymphatic filariasis, the drug, and mass drug administration

Less than half of subject mentioned there was drug for LF. Yet most of them failed to name the exact type of the drug. Most subjects correctly answered the questions on MDA is designed to combat LF, subjected to all community, implemented annually, the drug should be taken during MDA, pregnant mothers and people with severe illness should not take the drug. It was interesting to see that knowledge

about LF was associated with better compliance ($p=0.002$) compared to knowledge about MDA ($p=0.151$). This finding is consistent with results reported from Egypt [19]

Table 2. Knowledge of subjects

Knowledge of LF and DEC	Total (n=250)	Compliance (n=182)	Non-compliance (n=68)	p-value
Filariasis: definition, cause, risk factors, prevention				
- Poor	64.4	66.5	33.5	0.002
- Good	35.6	84.3	15.7	
Drug can cure LF				
- No	51.2	71.1	28.9	0.535
- Yes	48.8	74.6	25.4	
Drug to LF				
- DEC	6.0	80.0	20.0	0.727
- Other	42.8	73.8	26.2	
- Drug cannot cure	51.2	71.1	28.9	
Knowledge of MDA				
MDA is designed to cure LF				
- Yes	72.0	73.3	26.7	0.761
- No	28.0	71.4	28.6	
MDA is implemented annually				
- Yes	92.8	72.8	27.2	0.954
- No	7.2	72.2	27.8	
Drug should be taken during MDA				
- Yes	84.0	73.8	26.2	0.411
- No	26.0	67.5	32.5	
MDA is subjected to all people				
- Yes	98.4	73.2	26.8	0.302
- No	1.6	50.0	50.0	
Drug for LF patients only				
- Yes	14.4	71.0	29.0	0.125
- No	85.6	83.3	16.7	
Drug for those who aged ≥ 15				
- Yes	35.3	71.6	28.4	0.752
- No	64.7	73.3	26.5	
Pregnant mother should not take the drug				
- Yes	86.8	74.2	25.8	0.204
- No	13.2	63.6	36.4	
Children under 2 years old should not take the drug				
- Yes	40.4	81.2	18.8	0.014
- No	59.6	67.1	32.9	
People with severe illness should not take the drug				
- Yes	90.4	73.9	26.1	0.233
- No	9.6	62.5	37.5	
Level of knowledge on MDA				
- Poor	72.8	70.3	29.7	0.151
- Good	27.2	79.4	20.6	

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The knowledge gap with regard to the disease may be a major factor for lower compliance. Our study showed around two third of subjects were unaware about LF, and three-quarter were unaware about MDA program. Effective community mobilization activities are essential to strengthen the

people's knowledge and to change their perceptions regarding LF. Involvement of and coordination with other sectors, involvement of NGOs, local leaders, and self-help groups need to be emphasized. An effective health education campaign to make the community aware about LF and increase their participation in the MDA program is essential. The focus of the health education should be on locally-appropriate media.

Table 3. Socialization of mass drug administration received by subject

	Total (n=250)	Compliance (n=182)	Non-compliance (n=68)	p-value
Obtain socialization				
- No	28.8	18.1	81.9	0.000
- Yes	71.2	78.1	21.3	
Information detail	n=178	%		
Source of information				
- Cadre, neighbour, family	105	59,0		
- Health officer	43	24,2		
- Poster	2	1,1		
- Other	28	15,7		
Where to obtain information				
- Home	82	46,1		
- Office	1	0,6		
- Public health centre	49	27,5		
- School	2	1,1		
- Public places	4	2,2		
- Other	40	22,5		
When to obtain information				
- January	1	0,6		
- February	1	0,6		
- March	18	10,1		
- April	69	38,8		
- Do not remember	89	50,0		
Role of elimination officer	Yes		No	
	n	%	n	%
Deliver information about MDA	153	61.2	97	38.8
Deliver information that DEC must be taken	184	73.6	67	27.4
Deliver information of eligible people to take DEC	170	68.0	80	32.0
Deliver information about the benefit of MDA	181	72.4	69	27.6
Distribute DEC door to door	236	94.4	14	5.6
Entrust DEC into neighbouring	43	17.2	207	82.8
Deliver information about side effect of DEC	35	14.0	215	86.0
Directly observe when the subject take DEC	38	15.2	212	84.8

3.3. Socialization of mass drug administration and role of elimination officer

Most of the subjects claimed to have received socialization of LF and MDA (71.2%). The major source of information was disseminated by cadre, neighbour, and family (59,0%). Nearly half of subjects received the information at home (46.1%), but the majority of subjects have forgotten the time of socialization. Similar findings have been reported from other studies in India [18].

Our result reported most of elimination officers (EO) gave information about MDA to community (61.2%), that the drug must be taken (73.6%), who must take the drug (68.0%), the benefit of MDA (72.4%), and distributed the drug door to door (94.4%). However, only a few EO informed adverse reactions (14.0%). It was observed from the study that EO hardly supervised drug intake directly (15.2%) or just left the drug to the nearest neighbour (17.2%). There is an urgent need for more effective drug-delivery strategies that are adapted to local need [18]. Volunteering cadre as an unpaid EO requires an individual’s commitment, and the timing of MDA needs to be compatible with their other personal and professional obligations. The seasonal availability of EO upon which NTD programs are built should be recognized as a key ‘Process Indicator’ of equal importance as funding, logistics, policy, guidelines, supplies and training [25].

Table 4. Effect of community socialization and information to knowledge of mass drug administration

Socialization and information	Knowledge		p-value
	Good	Poor	
Obtain socialization			
- Yes	42.7	57.3	0.000
- No	18.1	81.9	
Obtain information from elimination officer			
- Yes	71.1	28.9	0.535
- No	74.6	25.4	

Socialization regarding to LF in our study significantly related to knowledge (p=0.000). And although cadre is the official elimination officer closest to the community, the information did not necessarily come from cadre. Knowledge is a predisposing factor to MDA compliance as shown in our study, and previous study [19,22]. However, most subjects of this study had low levels of knowledge. In general, people with low level of knowledge are not likely to comply with the treatment, which highlighted that people with low knowledge usually also gives low priority to disease prevention.

Our result suggested socialization especially related to compliance in female (Mantel-Haenszel test, p=0.007, data not shown). Understanding the gender distribution and gender-related gaps in knowledge and experience of disease burden is important to identify the target groups for intervention and design of gender-specific education materials.

3.4. DEC consumption practice and side effect during mass drug administration

MDA program had been implemented since 2011. The program used DEC, albendazole, and paracetamol during 2011-2014, and only DEC and albendazole since 2015. Community practice during MDA program was shown in Table 5.

Effective coverage rate is the product of coverage by the health system and compliance in the community. A sustainable high coverage of 85% or more is required for stopping transmission and elimination of disease from the community [26]. Our study showed most subjects claimed to take DEC during MDA implementation (72.8%). Nevertheless, most of them take the drug at night (87.9%) and after meal (98.4%). Consumption of the drug after meal resulted in poor compliance with drug intake [18].

Our study showed proportion of female who did not take DEC was nearly doubled that on male (Table 1). Pregnancy and breastfeeding were among the reasons for non-consumption of drug (7.4% and 22.1% respectively). It is generally expected that a higher percentage of males access MDA than females due to uncertainty related to pregnancy status [23] According to WHO, pregnant women and breast feeding mothers are not included in the MDA program [27].

Table 5. DEC consumption practice and side effect during mass drug administration

Compliance (taking DEC during MDA)	n=250	%
- No	68	27.2
- Yes	182	72.8
Reason of non-compliance	n=68	%
- Pregnant	5	7.4
- Breastfed	15	22.1
- Illness (high blood pressure, diabetes mellitus, vertigo, gout)	10	14.7
- In medication (other medicine)	2	2.9
- Do not suffer of filariasis	1	1.5
- Side effect	6	8.8
- Forget	5	7.4
- All family member non-compliance	4	4.4
- Not getting the drug	7	10.3
- Large size of the drug	1	1.5
- No reason	13	29.2
Experiencing side effect	n=182	%
- No	111	61.0
- Yes	71	39.0
Side effect	n=71	%
- Nausea	20	28.2
- Dizzy	47	66.2
- Other	4	5.6
Side effect	n=71	%
- Right after taking the drug	24	33.8
- An hour after taking the drug	26	26.6
- Two hours after taking the drug	9	12.7
- Three hours after taking the drug	9	12.7
- Four hours after taking the drug	1	1.4
- Other	2	2.8
Action when experiencing side effect	n=71	%
- Contact elimination officer	1	1.4
- Seek care in PHC	12	16.9
- Take symptomatic medicine	2	2.8
- Other	56	78.9

Overall, 10.3% subjects claimed they did not receive the drug. But even some of those who received the drug did not want consume it. It is interesting that 1.5% subjects felt unnecessary to take the drug because they were not suffer from LF, 4.4% subjects did not consume the drug because their whole family did not too, while 11.8% mentioned they just did not feel like taking the drug. A detailed probe into the matter might help us determine the other cultural and social factors related to gender which could have played a role in the compliance rate. Awareness and education certainly play a crucial role in the elimination of LF [28].

Fear of adverse reactions was also the reason our subjects did not want to consume DEC tablet (8.8%). We assessed the adverse reactions after consumption of DEC among the study population. Of 182 persons who consumed the drug, 39.0% reported adverse reactions. The most common side-effect was dizziness (66.2%), followed by nausea and/or vomiting (28.2%). These adverse reactions appeared right after and within an hour of drug intake. Theoretically, filariasis drugs were well-tolerated,

and side-effects were negligible. Although the adverse reactions were insignificant, fear of adverse reactions itself a major cause of non-compliance. Therefore, it is essential to deliver appropriate health information to address people's concerns and fears about the intervention and make arrangement for the management of cases. [18]

Adverse reactions following MDA are generally mild, and the frequency decreases after the first round of MDA [29]. However, a literature review showed that fear of adverse reactions is one of the major reasons people do not comply with MDA [30]. As a result, programs should ensure that health services are prepared to handle adverse reactions as they arise, especially in the early years of MDA. A good management of adverse reactions in these first years of treatment will benefit the program in subsequent years, as this will reassure communities that the drugs are safe and that the health services can be trusted. The positive benefits of MDA need to be communicated and reiterated during the pre-MDA socialization as well as at the time of pill distribution.

4. Conclusion

Coverage of MDA in Pekalongan in 2015 was 72.8%. The major issues of MDA implementation is compliance, health education, fear of adverse reactions, community motivation and participation. People do not have enough knowledge about the benefits of MDA in LF prevention. District health office and public health center need to provide community with adequate information. Further study is needed to identify the appropriate socialization model and information distribution to the community in endemic areas of LF.

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