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Sociodemographic, Knowledge, and Attitude Determinants of Lymphatic Filariasis Medication Adherence in Subang, Indonesia

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Abstract— Background: Adherence to lymphatic filariasis (LF) medication during the mass drug administration (MDA) program is an important factor for the success of the LF elimination program. Low adherence rate will likely increase the risk of filariasis transmission in the community. This study was aimed to explore factors associated with medication adherence among populations in Subang, West Java, Indonesia. Method: The researchers analyzed a subset of data obtained from 2017 LF multicenter study in Subang. 676 respondents were included in the analysis. Sociodemographic data including age, sex, marital status, and occupation as well as knowledge, attitude, and practices (KAPs) were collected. Multivariate analysis was performed to examine the effect of sociodemographic and KAPs on the adherence to anti-filariasis treatment. Results: In bivariate analysis, adherence was associated with attitude, gender, age, education and knowledge. In the multivariable model, adherence was significantly associated with education and knowledge. Conclusion: factors of education and knowledge were associated with medication adherence among populations in Subang. Socialization/monitoring of certain groups needs to be intensified to improve compliance and coverage of MDA so that the target of LF elimination can be achieved.

Keywords: socio-demography, knowledge, MDA compliance, filariasis

I. INTRODUCTION

The resolution of the World Health Assembly (WHA) in 1997 stated that lymphatic filariasis (LF) belongs to the category of neglected diseases, which attacks all ages and genders, suggesting that the disease is a global public health importance. [1] Indonesia is one out of 53 countries in the world which has been stated as endemic country for LF and the only country that has diverse filarial worms including *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*.[2] The World Health Organization (WHO) has set a target for global elimination of filariasis by 2020. In Indonesia, filariasis elimination program has been launched by the Indonesian Minister of Health since 2002. In 2014, Minister of Health issued Minister of Health Regulation Number 94/2014 to provide a standardized guidelines for LF control across the country.[3] This was then followed by the introduction of the national action known as Filariasis Elimination Month (*Belkaga*) in 2015.[4]

Until 2015, from a total of 14 districts/cities in Indonesia, 241 districts/cities have been identified as LF endemic area of which 54% of the districts had implemented mass drug administration (MDA) and 22% had completed 5 rounds of MDA. So far, there are still 18% of the districts/cities that have not implemented the MDA and some districts/cities (6%) have failed MDA.[5] Subang is one of the regions in West Java Province that has passed Transmission Assessment Survey (TAS)-1. LF control in Subang District began with the finger-prick survey in 2005 in four villages. The results of the microfilaria (Mf) rate were 1.38%. While, in 2016, a survey was conducted in two villages (Bongas and Curugrendeng) and resulted a Mf rate of 0%. Until 2017, clinical LF cases were identified in 30 patients across 17 sub-districts and 23 villages.[6] The MDA for all residents domiciled in Subang was given in 2011 and ended in 2015. From 2011 to 2015, the MDA coverage was 64.14%; 66.04%; 67.09%; 80%; and 84%, respectively with the annual average coverage was 72.25%. [6] Subang conducted an evaluation called TAS-1 to 1639 children aged 6-7 years and successfully passed TAS in 2017. The TAS-2 will be conducted in 2019.

At the beginning of its implementation, The MDA coverage in Subang was lower (64.14% population and 77.26% per target number) than WHO target (where per population was higher than 65% and MDA per target number was higher than 85%. The rate of drug adherence, however, has continued to increase in the subsequent treatment years. As a result, in the fourth and fifth years of MDA, the anti-filarial treatment coverage has reached over the WHO target. [6]

The anti-filarial medication adherence is a key factor for the success of MDA program. Low adherence rate will likely increase the risk of filariasis transmission in the

community. Studies have shown that there are a number of factors that may influence drug treatment compliance in the population including the characteristics of society [7], knowledge [8], socialisation and drug distribution [7], community practices in disease prevention and control [9] and side effects of medication [10]. [11] This study was aimed to explore factors associated with medication adherence among populations in Subang, West Java, Indonesia. The findings of the study could be useful for laying a foundation for policymaking to improve MDA and to ensure LF elimination in the remaining LF endemic areas in Indonesia.

II. METHOD

A. Study Design

This study was an analysis of secondary data from 2017 LF multicentre study conducted by *Badan Litbang Kemenkes* (National Institute of Health Research and Development (NIHRD), Ministry of Health of Indonesia. This multicentre study was performed as an evaluation study of filariasis elimination program in 2017. The protocol of the study was approved by ethicsclearance number LB.02.01/2/KE.167/2017. A cross sectional survey was conducted in Curugrendeng Village, Jalancagak Sub-district and Rancahilir Village, Pamanukan Sub-district, Subang, West Java, from July to August 2017. The survey was performed in two villages; Curugrendeng and Rancahilir. The reseachers defined Curugrendeng as a 'sentinel village' based on the Mf rate in 2005 (above 1%) while the latter was defined as 'spot village'. Both villages had chronic LF patients, but those patients already passed away.

The study population was all populations who received MDA. The sample size was calculated based on the formula that estimated one proportion by taking simple random sampling based on Stanley Lemeshow *et.al* (1997). [12] As a result, total of 676 respondents were surveyed. Sub-sample ≥ (respondents aged 15 years) were included in the analysis to assess factors that influenced anti-filarial medication adherence.

The data were collected by interviewing respondents using a structured questionnaire developed by WHO. The first respondent was chosen based on a criterion whether or not he/she stayed with chronic LF patients. Once the house of the LF patient identified, the researchers then sampled respondents living in the household nearby to the LF patient's house and so on until the minimum sample size had reached. They excluded residents who had difficulty in communicating (speech and hearing impaired), and elderly who had dementia.

B. Data Analysis

The dependent variable was the behavior of taking anti-filariasis medication. Mark "1" was given if the respondent took all medications. Otherwise "0" was given if respondent did not take treatment completely.

The independent variables of this study were socio-demographical data including age, sex, marital status, and occupation as well as knowledge, attitude, and practices (KAPs). The knowledge variable by asking respondents "what is the cause of LF infection and what is the transmitter of LF?". The respondent's knowledge level was defined as follow: if the respondent answered 'a worm' or 'a mosquito' to either of these two questions, then a high-score was given. Otherwise, low score was given. The attitude variable was constructed based on ten attitude-related questions. The score was calculated by assigning a score to each question as follow: "1" was given if the respondent answered 'not agree' on each statement: i) LF can be prevented by not taking filariasis medication; ii) If I don't take the drug, I'm sure I will not infected by LF; iii) if I take anti-filarial treatment, my feet/hands will swell; iv) I took anti-filarial drugs because I was advised by parents/family/village head/community figure/village health workers; v) I took anti-filarial drugs is because I was reluctant to the village head/community figure/village health workers. In addition, score "1" was given if respondent answered 'agree' on each of the following statements: i) LF could be prevented by simply sleeping under mosquito net; ii) If I took LF medication, we must have prior notice; iii) Taking anti-filarial medication will have side-effects; iv) by drinking anti-filarial drugs I will be healthy; and v) I took LF medication because of my own awareness. The attitude score was divided into three level. Scores 1-3 were categorized into low score, 4-7 were categorized into medium score, and scores above them were categorized as high score.

The bivariate analysis was carried out using Chi-square test. P-value of 0.25 was chosen to select independent variables included in the final multivariable analysis. A multivariate Binomial Logistic Regression was performed to assess the effects of independent variables on behavior of taking anti- filariasis medication. All statistical analysis were carried out using SPSS version of 17.

III. RESULTS

A. Socio-demographic characteristics of the respondents

In term of gender, the proportion of male and female interviewed was approximately equal number. However, more women were interviewed 57.4% compared to men 42.6%. Most of the respondents were 35-54 years (37.6%) and 5-14 years (18%). Most of the respondents were married (61.8%). Most respondents had attained elementary school (43.9%). However, not all respondents were asked questions about education as this question was only asked to respondents over 5 years old. There were a lot of respondents who did not work (56.94%). There were a lot of respondents who were entrepreneur (19.35%) as well. According to the attitude evaluation, a total of 26.5% of respondents had low score, 67% had medium score, and 6.5% had high score. (Table 1)

TABLE I. FREQUENCY DISTRIBUTION IN SUBANG, 2017

Variables	Frequency	Percent (%)
Gender		
Male	288	42.6
Female	388	57.4
Age group		
15-24	97	14.3
25-34	93	13.8
35-44	117	17.3
45-54	137	20.3
55-64	68	10.1
>=65	42	6.2
Marital Status		
Not married	219	32.4
Married	418	61.8
Divorce	39	5.8
Education level		
Never been studied at schools	20	3
Did not complete primary school	85	12.6
Completed primary school	297	43.9
Completed junior high school	117	17.3
Completed senior high school	88	13
Completed Diploma	6	0.9
Completed University	7	1
Occupation		
Unemployed	353	56.94
Office Staff	24	3.87
Entrepreneur	120	19.35
Farmer	94	15.16
Other	29	4.68
Attitude		
Low score	147	26.49
Medium score	372	67.03
High score	36	6.49
Knowledge		
Poor	313	56.40
Good	242	43.60

Table 2 shows that only 3.6% respondents knew that LF was a disease caused by worms, and only 33.9% mentioned that LF was a mosquito-borne disease. 71.1% of the respondents complied with taking anti-filarial treatment as suggested (table 3).

TABLE II. RESPONDENTS' RESPONSES REGARDING CAUSES OF LF, SUBANG 2017

Causes of filariasis	Yes		No		Total	
	N	%	N	%	N	%
Caused by worms	20	3	535	79,1	555	82,1
Transmitted by mosquitoes' vector	229	33,9	326	48,2	555	82,1

TABLE III. PROPORTION OF RESPONDENTS COMPLIED WITH ANTI-FILARIAL MEDICATION, SUBANG, 2017

Medication Compliance	Frequency	Percent (%)
Comply	62	9,2
Did not comply	480	71
Total	542	80,2

B. Bivariate and multivariate analysis

The bivariate analysis showed that attitude, gender, age, education and knowledge were significantly associated with LF MDA compliance ($p < 0.25$). Therefore, occupation and marital status were not included in the multivariate logistic regression analysis as they significantly associated with LF MDA compliance significantly ($p > 0.25$) (Table 8). Table 9 shows the final multivariable model of the effects of sociodemographic factors, knowledge, attitude/practice on anti-filarial treatment. In the multivariable model, education and knowledge were significantly associated with anti- filarial adherence ($p < 0.05$). The higher respondent's education, the lower Filariasis MDA compliance. Respondents who attained at least junior high school had MDA compliance 0.49 times lower compared to those with low education. Respondents who attained university or higher education had MDA compliance 0.231 times lower compared to those with low education. Respondents with good score knowledge had MDA compliance 2.66 times higher compared to those who had low knowledge score.

TABLE IV. BIVARIATE ANALYSIS OF THE ASSOCIATION BETWEEN SOCIODEMOGRAPHIC AND ANTI-FILARIAL TREATMENT COMPLIANCE

No	Independent variables	Not comply (%)	Comply (%)	OR	95% CI	p
1	Male					
	Female	22.9	77.1	1.38	0.94-2.03	0.099
	Men	29.1	70.9			
2	Age groups					
	< 25 years old	31.7	68.3	1.36	1.02-1.82	0.038
	25-50 years old	25.7	74.3			
	>51 years old	25.4	79.9			
3	Attitude					
	Low Score	32	68	1.29	0.91-1.84	0.158
	Medium Score	22.3	77.7			
	High Score	30.6	69.4			
4	Knowledge					
	Poor	31.6	68.4	2.2	1.46-3.32	<0.001
	Good	17.4	82.6			
5	Occupation groups					
	Unemployed	26.6	73.4	1.08	0.95-1.22	0.273
	Office Staff	33.3	66.7			
	Entrepreneur	25.8	74.2			
	Farmer	23.4	76.6			
	Other	20.5	79.5			
6	Education					
	Low	23.6	76.4	0.59	0.42-0.84	0.003
	Medium	31.2	68.8			
	High	46.2	53.8			
7	Marital status					
	not married	37.6	62.4	1.13	0.76-1.67	0.55
	married	25.1	74.9			
	divorced	23.1	76.9			

TABLE V. FINAL MULTIVARIATE MODELS OF THE ASSOCIATION BETWEEN SOCIODEMOGRAPHIC AND ANTI-FILARIAL TREATMENT COMPLIANCE

Independent Variables	B	OR	95% CI	p
education (low)*	-	-	-	0.001
education (medium)	0.719	0.487	0.321-0.739	0.001
education (high)	1.467	0.231	0.072-0.740	0.014
knowledge	0.98	2.66	1.73-4.10	0.000

IV. DISCUSSION

According to Noor [13], age is one of the characteristics that closely related to many factors. It also has close links with employment, marriage and reproduction.[13] However, the reseachers' findings showed that age was not statistically significant for influencing filariasis medication compliance (p=0.038). The results were consistent with study in Baktijaya Depok, West Java Province[14], which found that practices related to LF MDA compliance among different age-group were not significantly different.[14] In addition, a study in Mumbulsari District, Jember, East Java found that there was no correlation between age and compliance.[15] Similarly, a study in Sukajadi village, Banyuasin, South Sumatra, found that age was not statistically significant correlated with anti-filariasis medication.[15] In contrast, a study in Pondicherry, South India suggested that filariasis drug-taking behavior score was significantly lower among respondents who were 61 years or above.[16] Moreover, in Purilia District, West Bengal, the scope of mass treatment of filariasis and filariasis drug-taking behavior was decreased with age.[17] This discrepancy among studies may partly be due to socio-cultural differences between locations.

This study indicated that the males appeared to be less likely to take anti-filarial medication compared to female. This was indicated by the higher proportion of men (32.99%) who did not take filariasis drugs that was relatively to women (26.03%). In Indonesia, men usually do a major role in economy so that more men are working than women. Men who work may know that filariasis drugs have side effects and therefore can interfere their health and thus affect their economy. Because they do not want their work disrupted, men tend not to take anti-filariasis drugs. This finding was consistent with a study conducted in Pondicherry, South India, which also found that the majority of men were less likely to take LF medication compared to women.[16]

This study showed that anti-filarial medication compliance was not influenced by gender. This supported a research finding from Sukajadi Village, Banyuasin Regency, South Sumatra Province which also found no relationship between gender and filariasis drug-taking behaviour. [15] Similarly, a study in city of Depok, Baktijaya Village, West Java, indicated no significant relationship between gender and compliance in taking filariasis medicine.[18] In Taraba City, Nigeria, gender was also not related to respondent's concern about the spread of LF.[19]

Employment indirectly affects a person's health. Generally, people who pay attention to their income are also aware of their health as health is an important factor to achieve success at works. People who suffer from acute LF may generally experience obstacles in finding work and earning income.[20] In this study, the proportion of respondents who worked and did not take filariasis drugs was higher (56.8%) when compared to the proportion of respondents who did not work and did not take filariasis drug (43.2%). This may be due to those people may not have adequate access for the information associated with LF and MDA. For example, people who work may assume that the side effects of LF drugs may interfere their daily activities. In fact, if people have better understanding on the side effects of the drugs, this may be a good indicator as side-effects were present, they show that the drug works to kill microfilariae or filariasis adult worms in our body.[21] A study in Jambi demonstrated that the implementation of DEC treatment was difficult since people were afraid of the side effects of treatment, such as dizziness and nausea. The community believed that people who were not sick may become ill after taking the medicine. This perception may cause the drug treatment coverage to be lower than expected. [22]

This study demonstrated that occupations were not statistically significant for anti-filariasis medication compliance. Similar results were also reported from a study in Sukajadi Village, Banyuasin Regency, South Sumatra Province, which demonstrated no relationship between occupation and filariasis drug-taking behaviour. [15] A study conducted in Philippines also showed similar result that there was no relationship between occupation with filariasis drug-taking behaviour.[23]

In this study, the researchers found that the proportion of respondents who were never married and not taking anti- filariasis medication was higher (37.6%) compared with the proportion of respondents who were married (25.1%) or divorced (23.1%). However, this model indicated that there was no significant relationship between marital status and drug compliance. This is in line with study in Taraba City, Nigeria, which showed that the marital status of respondents were not statistically related to LF transmission.[19] Additionally, a study in Myanmar also reported that the relationship between marital status and filariasis drug-taking behaviour was not statistically significant.[24]

This study indicated poor knowledge on LF transmission among respondents. Only 3.6% of the respondent who knew the causes of LF and only 41.3% knew how LF was transmitted. This finding was consistent with a study in West Bengal, India, hich found only 30.34% of respondents who had knowledge of LF transmission. [25] In addition, Haldar and colleagues found that only 47% respondent answered correctly on the question about filariasis transmission. [26]

Respondents who took the drug in this study were more aware of filariasis transmission compared to respondents who did not take medication. Fairly good knowledge about filariasis vectors was also reported by a study in Chennai which stated that the majority of respondents in these studies knowing that filariasis was transmitted by mosquitoes (60%).[27] This study found that respondents with good knowledge were more obedient to take medication than those with less knowledge. Similar results

were also reported from a study conducted by Elaziz[28] which suggested that males were more knowledgeable about the disease relatively to female. The study indicated that better knowledge may cause men to be more obedient to taking medication than women. MDA compliance was also shown by a schistosomiasis study conducted in the Philippines. This study mentioned that respondents who knew how the disease transmitted become more obedient to taking medicine than those who did not know.[29]

A number of studies reported that understanding the causes of LF and how the disease could be prevented could influence community's compliance[30],[31] Therefore, it was necessary to improve health education programs as it could increase people's knowledge and awareness on risk factors of LF transmission. That could help trigger community to take necessary preventive measures to avoid mosquito bites and to involve reducing the transmission (e.g., vector control, breeding sites eradication).[32]

Filariasis mosquitoes transmitted vectors and they were associated with better medication compliance based on a review conducted by Krentel.[30] This was also revealed by a research conducted in Pekalongan, Indonesia.[33] Ignorance about how filaria spread could be a major factor causing low compliance in taking medication. This study showed that 48.2% of respondents did not know the spread of this disease. People who had less knowledge generally did not give priority in preventing the disease. Dissemination of this knowledge was very important to strengthen people's knowledge and to change their perception about filariasis.[33]

The results of this study indicated that education also had a potential factor to influence community compliance in taking filarial drugs. This study showed that the percentage of medication compliance for respondents with low education was higher than the percentage of respondents with higher education. Unfortunately, this study did not look any further about the completeness of the information provided during drug administration. A study conducted in Sri Lanka found that non-compliance in taking drugs was due to the lack of information available to take filarial drugs.[34] There was a possibility that the higher the education, the greater the need for drug information. Thus, it caused less interest in taking medicine because the information needed was not proportionate with their availability. A research in Bandung mentioned that knowledge and active participation of health cadres was one of the triggers that increase medication coverage. Health cadres and filariasis MDA dissemination to society would increase public knowledge and would indirectly increase filariasis medication coverage.[11]

This study only discussed some factors that might influence medication compliance. In addition to all the variables mentioned in this study, there were other factors that might affect medication compliance andthey were not discussed in this study. The researchers considered that those would to be the limitation of this study. These factors were side effects from medications, frequency of exposure to MDA experience, knowledge of the MDA, the way of drug administration (whether by directly observed therapy or not) as well as the distribution of MDA surveillance by health officials .[35],[36]

V. CONCLUSION

The analysis of the relationship between socio-demography, knowledge and attitudes of the villagers of Curugrendeng (sentinel village) and Rancahilir (spot village) regarding the coverage of MDA compliance showed that factors of education and knowledge associated with medication adherence among populations in Subang.

Socialization/monitoring of certain groups needed to be intensified to improve compliance and coverage of MDA so that the target of LF elimination could be achieved. Some efforts were needed to increase knowledge through the dissemination of MDA to the community with various media, especially television or social networks. Knowledge of the health cadres should be improved through training, because health cadres stayed in front line who dealt directly with the community. So, they must be equipped with good knowledge and skills.

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CONFLICT OF INTEREST

The authors declared that the first author (Mutiara Widawati) and the second author (Endang Puji Astuti) had an equal contribution to this study. The funder (NIHRD-MoH Indonesia) had a role in giving the suggestion to the design, the collection, the analyses data, and in the decision to publish the results from the multicentred research. However, the funder had no role in this secondary data analysis.

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