

Conference Paper

Determinant Factors of Taking Anti-Filarial Medication Behavior in the First Round of the Mass Drug Administration Program with Ivermectin, Diethylcarbamazine Citrate, Albendazole: A Cross Sectional Study

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ABSTRACT

Filariasis is still endemic in Indonesia with the criteria for a microfilaria rate of >1%, therefore WHO extended the Mass Drug Administration (MDA) program with Ivermectin, Diethylcarbamazine Citrate, Albendazole (IDA). Pekalongan City is one of the filariasis endemic areas in Central Java, Indonesia, which will receive an extension of the MDA program in 2021 and 2022, with a survey coverage of <65% of the population. The study aimed to prove the determinant factors associated with IDA drug-taking behavior to increase treatment coverage. Community-Based Survey conducted in 10 villages in 3 sub-districts in Pekalongan City with a Cross Sectional design using a structured questionnaire interview method, and a sample size of 546 respondents using Probability Proportional to Size and was taken by simple random sampling. Data analysis used the Chi Square statistical test and Logistic Regression. The age distribution of respondents > 42 years dominated by 54,0%, Female Gender dominated by 71,8%. Determinants of IDA Drug Distribution (p-value = 0,000, PR value = 2,498, 95% CI: 1,400-4,459), Willingness to Take Second IDA Drugs (p value = 0,000, PR value = 5,325, 95% CI:1,520-18,656), Assistance for Health Workers (p-value = 0,000, PR value = 2,690, 95% CI: 1,681-4,306), Agree to IDA drug distribution (p value = 0,008, PR value = 1,593, 95% CI: 0,778-3,259) has a significant relationship with IDA drug-taking behavior, and the logistic regression results of assisting health workers (OR = 76,002, 95% CI: 24,901-231,975) are the determinants most related to drug taking behavior IDA. It is necessary to assist health workers in the practice of taking IDA drugs in the next period. Health workers or health cadres must ensure that people take IDA drugs to increase treatment coverage, to accelerate the elimination of filariasis in Pekalongan City.

Keywords: Filariasis, determinant factors, IDA drug-taking behavior, mass drug administration, assistance by health workers.

Introduction

Filariasis is known as elephantiasis because there is an enlargement of the legs, lower extremities, scrotum, breasts, and even swelling of the vaginal vulva (Tyagi, 2018). The disease is caused by the worm nematode *Filariodea spatiales Wuchereria bancrofti*, *Brugia Malayi*, *Brugia Timori*, which is transmitted by various general of mosquitoes such as *Culex*, *Anopheles*, *Aedes*, *Mansonia* and *Armigeres* (Arsin, 2016). Filariasis is still endemic in several countries, including Indonesia, with the criteria for a microfilaria rate of >1% (WHO, 2022). Based on this, WHO launched the Mass Drug Administration (MDA) program in several endemic countries, including Indonesia,

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with the Diethylcarbamazine Citrate and Albendazole regimen, which was once planned to lead to filariasis elimination in 2020 (WHO, 2011). The MDA, which ends in 2020, must experience an extension of treatment with the Ivermectin, Diethylcarbamazine Citrate, and Albendazole (IDA) regimen, which is planned to end in 2030 because several countries have not yet experienced filariasis elimination (WHO, 2021).

The data shows that one of Indonesia's provinces, an endemic filariasis area, is Central Java Province (Kemenkes, 2020a). One of the districts/cities in Central Java that has received an MDA extension is Pekalongan City. Data shows cases of filariasis from 2004 to 2017, as many as 417 people (for clinical cases) and as many as 40 people (chronic issues) (Dinkes, 2017). Pekalongan City also received a mass treatment program from 2011 to 2015 using the Diethylcarbamazine Citrate and Albendazole (DA) regimen with a treatment coverage of 76.3% (Kemenkes, 2019a). Based on the evaluation of the Transmission Assessment Survey (TAS) in 2016, there were still positive cases of filariasis with a *Microfilaria* rate of >1% (Kemenkes, 2019a). Based on the TAS results, WHO extended mass treatment with DA in the Pekalongan City area for two consecutive years, namely in 2017 and 2018, resulting in treatment coverage of 86% in 2017 and 88% in 2018 (Kemenkes, 2019a; Dinkes Pekalongan, 2019). Evaluation of the mini Transmission Assessment Survey in 2019 with detection using the Filaria Test Strip (FTS) antigen obtained 13 positive results from 1804 samples in low-endemic sub-districts, Pekalongan City (Kemenkes, 2019b).

Based on this, Pekalongan City is one of the endemic areas that will receive an extension of mass treatment with the IDA regimen in 2021 and 2022 (Kepmenkes, 2021). The treatment coverage survey carried out in 2021 is still < 65% of the population, meaning it is still below the WHO target. This can be caused by various determinant factors influencing the behavior of taking medication from respondents, including Saturation of Anti-Filarial Drugs, Knowledge of IDA Treatment, Side Effects of Taking Medication, Drug Distribution, Influence of the Social Environment, and Assistance of Health Workers. Previous research in 2020 regarding the behavior of taking filariasis medication with the DA regimen (Diethylcarbamazine Citrate and Albendazole) stated that the characteristics of respondents who tended to adhere to taking filariasis medication with the DA regimen were respondents in the age group 26-45 years (82.6%), gender male (80.5%), education level completed junior high school (89.5%), respondents who worked (81.5%), had a good level of knowledge about filariasis (84.6%) and about mass treatment (MDA) (91.6%), respondents who received cadre support (91.7%) and social support (88.9%) (Sari et al., 2020). Previous research in 2021 stated that factors that influence adherence to taking filariasis medication for the DA regimen (Diethylcarbamazine Citrate and Albendazole) include a high level of knowledge (OR=1.91, 95%CI:1.34-2.74, P-value<0.001), high sense of trust in the medicine provider (OR=4.93, 95%CI:2.17-11.22, P-value<0.001), feeling a high moral obligation to take medicine (OR=2.39, 95%CI:1.15-4.94, P-value=0.019), and received social support for taking medication (OR=5.12, 95%CI:3.18-8.23, P-value<0.001) in Ambon (Iwan et al., 2021). In 2022, another research will be conducted on factors related to the behavior of taking filariasis drug regimen DA. Gender (p = 0.794), age (p = 0.372), education (p = 0.263), knowledge (p = 0.536), and attitude (p = 0.765) are not related to medication-taking behavior in Kotawaringin Regency, but other factors influence residents to adhere to taking filariasis medication (Suryatinah & Rahayu, 2022). So there is a need for research in the following year to find out what determinant factors can influence the behavior of taking IDA antifilaria medication among residents in Pekalongan City who receive extended treatment with a new drug regimen, to increase treatment coverage to >65% of the population.

Material and Methods

Study location

The study was conducted in 10 sub-districts/villages in 3 sub-districts with a history of high endemic (*Microfilaria* rate >1%) in Pekalongan City, Central Java, Indonesia, with the criteria of obtaining an extension of the IDA regimen filariasis mass treatment program (Ivermectin,

Diethylcarbamazine Citrate, Albendazole). The urban villages included in the community-based survey had Bandengan Village and Padukuhan Kraton Village (North Pekalongan District), Pasirkratonkramat Village, Tirto Village, Pringrejo Village (West Pekalongan District), Banyurip Village, Buaran Kradenan, Jenggot, Kuripan Yosorejo, Kuripan Kertoharjo (South Pekalongan District) (Kemenkes, 2020b).

Target population, research methodology, and survey design

The target population in this study was residents aged 18-65 years who were registered as residents in 10 high-endemic filariasis villages in Pekalongan City and received IDA anti-filaria drugs and close to residents who had a history of positive cases. The sample size was determined using the PPS (Probability Proportional to Size) method, with 546 samples taken by simple random sampling in 10 villages.

This research is explanatory, namely a survey method with a cross-sectional approach. A survey on drug-taking behavior and the determinants that influence drug-taking behavior was conducted after implementing the first round of mass drug treatment with IDA in Pekalongan City.

The drug-taking behavior survey used a structured questionnaire with question items about the behavior of actually ingesting IDA drugs (dependent variable), characteristics of age, sex, saturation with anti-filaria drugs, knowledge about IDA treatment, side effects of taking drugs, drug distribution, social environmental influences, and Health Officer Assistance (independent variable).

Informed consent and ethics approval

Informed consent was given to samples or respondents aged 18-65 years after explaining the research procedures to the respondents. Questionnaires were given to respondents directly to be signed if they agreed to participate in this research.

This research has been approved by the Health/Medical Research Ethics Commission, Faculty of Public Health, University of Indonesia, with the protocol number: Ket-41/UN2.F10.D11/PPM.00.02/2023.

Data and sample collection

Sample criteria

The selection of respondents in this study were residents living in filariasis endemic areas aged 18-65 years and close to residents who had a history of positive cases in 10 sub-districts using simple random sampling and were registered as recipients of the IDA regiment filariasis medication (Ivermectin, Diethylcarbamazine Citrate, albendazole).

Structured interview

The community-based survey in this study involved collecting data on the behavior of taking the first round of IDA filariasis medication (the dependent variable), characteristics of age, sex, a saturation of anti-filaria drugs, knowledge of IDA treatment, side effects of taking medication, drug distribution, social, environmental influences, and Assistance for health workers (independent variable) obtained from structured interviews (paper-based). Respondents were selected by visiting the households randomly sampled in each village. After that, each house was interviewed using a structured questionnaire by the pre-research sample criteria.

Data analysis

Data analysis used the SPSS application version 20, with the Chi-Square statistical test, to see the determinant factors associated with the first round of IDA drug-taking behavior. In addition, it was analyzed multivariate using logistic regression to see the determinant factors most related to the behavior of taking medication in the population.

Results and Discussion

Results

Frequency distribution

Table. 1 Variable frequency distribution

Variable	F	%
Age Category		
< 42 years	251	46,0
>42 years	295	54,0
Gender		
- Man	154	28,2
- Woman	392	71,8
IDA Drug Distribution		
- No	18	3,3
- Yes	528	96,7
IDA Drug-Taking Behavior		
- No	26	4,8
- Yes	520	95,2
Willingness to Take Second IDA Medication		
- No	11	2,0
- Yes	535	98,0
Assistance by Health Workers		
- No	30	5,5
- Yes	516	94,5
IDA Treatment Knowledge		
- No	41	7,5
- Yes	505	92,5
Agree to IDA Drug Distribution		
- No	5	0,9
- Yes	541	99,1
Treatment Saturation State		
- Yes	75	13,7
- No	471	86,3
IDA Drug Side Effects		
- Yes	100	18,3
- No	446	81,7
Social Support		
- No	0	0,0
- Yes	546	100,0
Total	546	100,0

Based on the frequency distribution analysis, the following results were obtained: the age category of respondents > 42 years (54.0%) dominated compared to the age category < 42 years. The gender of female respondents dominated (71.8%) compared to the sex of male respondents. Respondents who received IDA drugs dominated (96.7%) compared to respondents who did not receive IDA drugs. Respondents who had the behavior of taking IDA medication in the first round dominated (95.2%) compared to respondents who did not take IDA medication in the first round.

Respondents with a willingness/intention to take the second IDA medication dominated (98.0%) compared to respondents who did not have the willingness/intention to take the second IDA medication. Respondents who claimed to have received assistance from health workers when taking IDA medication in the first round dominated (94.5%), compared to respondents who claimed not to have been accompanied by health workers when taking IDA medication. Respondents who knew IDA treatment dominated (92.5%) compared to respondents who did not know about IDA treatment. Respondents who agree with the distribution of IDA drugs dominate (99.1%), compared to respondents who disagree with the distribution of IDA drugs. Respondents who did not have an addiction to anti-filaria drugs dominated (86.3%) compared to respondents who had an addiction to anti-filaria drugs. Respondents who did not have side effects from taking IDA medication dominated (81.7%) compared to respondents who had side effects from taking IDA medication.

Determinant factors of IDA drug-taking behavior

Table 2. Determinant factors with ida drug-taking behavior

Variable	IDA Do Not Take IDA Drugs		Take IDA Drugs		PR (95% CI)	P
	n	%	n	%		
Age Category						
- <42 years	11	4,4	240	95,6	1,007(0,970- 1,046)	0,885
- >42 years	15	5,1	280	94,9		
Gender						
- Man	6	3,9	148	96,1	1,013(0,974- 1,053)	0,710
- Woman	20	5,1	372	94,9		
IDA Drug Distribution						
- No	11	61,1	7	38,9	2,498 (1,400- 4,459)	0,000*
- Yes	15	2,8	513	97,2		
Willingness to Take Sec- ond IDA Medication						
- No	9	81,8	2	18,2	5,325 (1,520- 18,656)	0,000*
- Yes	17	3,2	518	96,8		
Assistance by Health Workers						
- No	19	63,3	11	36,7	2,690 (1,681- 4,306)	0,000*
- Yes	7	1,4	509	98,6		
IDA Treatment Knowledge						
- No	3	7,3	38	92,7	1,030 (0,943- 1,125)	0,676
- Yes	23	4,6	482	95,4		
Agree to IDA Drug Distri- bution						
- No	2	40,0	3	60,0	1,593(0,778- 3,259)	0,008*
- Yes	24	4,4	517	95,6		

To be continued...

Variable	IDA Do Not Take IDA Drugs		Take IDA Drugs		PR (95% CI)	P
	n	%	n	%		
Saturated with IDA Drugs	5	6,7	70	93,3	1,024	0,588
- Yes	21	4,5	450	95,5	(0,981-	
- No					1,091)	
IDA Drug Side Effects						
- Yes	4	4,0	96	96,0	0,946	0,892
- No	22	4,9	424	95,1	(0,946-	
					1,036)	
Total	26	4,8	520	95,2		

**The candidate variable enters into a logistic regression*

Based on the Chi-Square statistical analysis, it was found that the variable had a significant relationship with the behavior of taking the first round of IDA medication and as a determinant factor, namely the distribution of IDA drugs (p-value = 0.000 <0.05, PR value = 2.498, 95% CI: 1.400-4.459), Willingness to take the second IDA medication (p-value = 0.000 <0.05, PR value = 5.325, 95% CI: 1.520-18.656), Assisting Health Workers (p-value = 0.000 <0.05, PR value = 2.690, 95% CI: 1.681-4.306), Agreed on the distribution of IDA drugs (p-value = 0.008 <0.05, PR value = 1.593, 95% CI: 0.778-3.259). These four variables are candidates for logistic regression analysis with the criterion of a p-value <0.25. They are nominal dichotomous variables to determine which variable or determinant factor is most related to IDA drug-taking behavior.

The final logistic regression modeling showed a significant relationship between the desire to take the second drug and the behavior of taking the IDA drug (p = 0.012, PR = 20.630, 95% CI: 1.950-218.266). The absence of a willingness/intention to take the second IDA drug has a risk of 20 times not having the behavior of taking the IDA drug in the first round. There is a significant relationship between assisting health workers and the behavior of taking IDA medication (p = 0.000, PR = 76.002, 95% CI: 24.901-231.975). The absence of assistance from health workers has 76 times the risk of not having the behavior of taking IDA medication in the first round with a probability of 96,62%.

Discussion

Determinants of drug-taking behavior IDA

Based on the characteristics of the age category of respondents > 42 years, respondents who did not have the behavior of consuming anti-filaria drugs with IDA (Ivermectin, Diethylcarbamazine Citrate, Albendazole) were dominated by 5.1%, more significant than the age category <42 years by 4.4%. This can be influenced by the saturation of consuming anti-filaria drugs at a productive age (Sitohang et al., 2017) because Pekalongan City, as an endemic filariasis area, has carried out a mass treatment program with DA (Diethylcarbamazine Citrate and Albendazole) from 2011 to 2015 (Kemenkes, 2019a). However, based on this study, it was not proven that the respondent's saturation with anti-filaria drugs (p = 0.588 > 0.05, PR = 1.024, 95% CI: 0.981-1.091) could affect the behavior of taking IDA drugs; this could be because the respondents who were selected in this study were partially Most of them do not experience saturation and are obedient in taking anti-filaria drugs.

The determinant associated with the behavior of taking IDA medication in the population is the distribution of IDA drugs (p-value = 0.000 <0.05, PR value = 2.498, 95% CI: 1,400-4,459), meaning that the unequal distribution of drugs is significantly related to behavior residents who do not consume IDA drugs. Most of this study's respondents answered not accept the distribution of anti-filaria drugs with IDA. They did not consume these anti-filaria drugs, compared to respondents who received anti-filaria drugs with IDA and consumed them in the first round of the MDA treatment program extension in Pekalongan City, Central Java, Indonesia. Most respondents

admitted that they did not receive the IDA drug distribution because they had forgotten or did not receive the drug. The value of PR = 2.498 indicates that respondents who said they did not receive IDA anti-filaria drugs had a risk of 2.498 times not taking IDA drugs in the first round, with a value range of 95% CI: 1,400-4,459, which means that this study has precision. Based on Lawrence Green's theory, namely enabling factors that allow behavior to occur, the availability of health services and accessibility and ease of health services both in terms of distance and cost and social (Pakpahan et al., 2021), in this case, the availability and ease of access to IDA drugs can affect the behavior of the population to consume these IDA drugs.

Another determinant related to the behavior of taking IDA medication in the population is the willingness or intention of respondents to take IDA medication in the second round (p -value = 0.000 < 0.05, PR value = 5.325, 95% CI: 1.520-18.656), meaning that the respondent who is not willing or intends to take IDA drugs in the second round is significantly associated with the behavior of residents who do not take IDA drugs in the first round. The PR value = 5.325 indicates that respondents who said they were unwilling or did not intend to take IDA anti-filaria medications in the second round had a 5.325 risk of not taking IDA drugs in the first round. Based on the Theory of Planned Behavior, the encouragement of a person's interest to manifest their behavior when they have complete control over their interest, where the power of control that a person feels will depend on the resources they have and also the opportunities that exist for them (Pakpahan et al., 2021). In this theoretical model, it is assumed to have a critical role in the emergence of a person's interest in behaving. This makes residents interested in taking IDA drugs in the second round, where they have control over their opportunities (Pakpahan et al., 2021). In addition, the knowledge possessed by respondents about the benefits of filariasis treatment can also encourage respondents to adhere to taking IDA drugs. Previous research stated that the lack of public understanding of filariasis in Baktiya District, North Aceh impacted adherence to filariasis treatment in the area (Yuziani et al., 2021). In this study, it was not proven that insufficient knowledge was related to the behavior of taking IDA medication.

The determinant associated with the behavior of taking IDA medication in the population is the assistance of health workers (p -value = 0.000 < 0.05, PR value = 2.690, 95% CI: 1.681-4.306), meaning that respondents who health workers did not accompany in the practice of taking medication IDA is significantly related to the behavior of residents not taking IDA drugs in the first round. Previous research stated that respondents with the support of health cadres and social support tended to adhere to taking anti-filaria drugs (Sari et al., 2020). Some of the respondents in this study who did not take IDA drugs admitted that they were not accompanied by local health workers (both from the public health center and health cadres). Respondents acknowledged that they were from the health agency, in this case, the *puskesmas*, ordered them to report taking IDA medication by providing evidence of selfies while taking medication. This is less effective because health workers do not see directly that they ingest IDA drugs. Previous research in one of the sub-districts in this study, namely Kelurahan Kertoharjo, Pekalongan City, was a quasi-experimental study with a total of 176 experimental samples and 176 control samples, stating that assisting health workers was effective in increasing the coverage of filariasis mass treatment, with a treatment coverage of 74.4% after the existence of an intervention model for helping health workers in the practice of ingesting anti-filaria drugs (Afrida, 2011). The logistic regression analysis in this study also proved that assisting health workers in taking IDA medication was the determinant most related to the behavior of taking IDA medication in the first round.

A systematic review study with the title "Introduction of Triple-Drug Therapy for Accelerating Lymphatic Filariasis Elimination in India: Lessons Learned", states that one of the approaches and strategies used in India, namely training health workers and drug administrators before implementing IDA, includes aspects of the use and clarity of the appropriate dose of IDA, and training on the main messages that will be conveyed to the public about the benefits of IDA [20]. Health cadres whose role is to convey directly the provision of IDA to the community, apart from receiving training, must also be able to convey it to the community well after receiving

training so that the community is also willing to receive IDA medication and consume it directly. Another approach and strategy used in India is finger marking of people and homes who have received the drug and who have consumed the drug with ink or marker (Tripathi et al., 2022). Apart from that, there is also a strategy to invite public figures to campaign for IDA so that young people will be interested. This can also be adopted, especially in Pekalongan City, by collaborating with local public figures who are widely known from young people to adults.

Conclusion

This study concludes that it is necessary to assist health workers in taking IDA drugs in the next period. This is because, in the first round of filariasis treatment, not all respondents were accompanied by health workers or cadres in the practice of taking the IDA regimen of filariasis medication. All people in endemic areas should take medicine in front of health workers or health cadres, whether the medication is distributed directly or the community visits the post to take filarial medicine, do not report using photos without being accompanied by a health worker or health cadres. Health workers or health cadres must ensure that people take IDA drugs to increase the treatment coverage.

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