Compliance to Annual Ivermectin Treatment in Abia State, South Eastern Nigeria

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Abstract

A study with the objective of determining the rate of individual compliance to annual ivermectin treatment was conducted in Abia State, south eastern Nigeria between January and November, 2011. The study captured the Local Government Areas in Abia State that were assessed by Rapid Epidemiological Mapping for Onchocerciasis (REMO) as being hyper-endemic for onchocerciasis and which have been receiving ivermectin for over 14 years. A study questionnaire was designed to investigate the rate of compliance and this was distributed to 558 individuals. The result showed that out of 558 individuals, 309 (55.4%) had taken the drug before while 249 (44.6%) claimed they have not been treated before. Despite the treatment over time, only 70 (22.7%) of those treated before were high compliers (that is, those who had been treated eight times and above). The overall percentage of high compliers in the sampled communities was only 12.6%. Reasons for low compliance include "lack of information on the arrival of drug" (27.8%), "no reason for refusal" (22.2%)," absent, away from village" (20.0%) and "no distribution" (19.7%). In testing the reasons for low compliance, the Chi-square analytical technique on the data revealed that the reasons given by the respondents for low compliance were not significant ($\chi^2_{cal} = 1.797 < \chi^2_{tab} = 16.9190$), and therefore do not affect general compliance.

Key words: Compliance, Annual ivermectin treatment, Onchocerciasis

1. Introduction

Onchocerciasis is one of the most important chronic parasitic diseases afflicting millions of people in the tropical and sub-tropical zones. It is one of the major endemic diseases which in addition to causing untold human suffering, is a major obstacle to socioeconomic development (WHO, 1995). Onchocerciasis is prevalent in about 37 countries of the world and is the world's second leading cause of blindness (Nwoke *et al.*, 2006) Thirty of these endemic countries are in tropical Africa, south of the Sahara; six are in Central and South America and one in Yemen, the Arabian Peninsula (Haslett *et al.,* 2002). Clinically, Onchocerciasis is associated with a lot of ocular and dermal manifestations. More than 123 million people live in endemic areas, and an estimated 17.7 million people are currently infected (WHO, 1995; Global 2000 RBP, 1998; *http: //www.cdc.gov.,* 2008). It is the blinding implication of the disease that has made it one of the major targets for control by World Health Organization (WHO, 1995).

Currently, ivermectin (Mectizan), a semi-synthetic macrocyclic lactone produced by the actinomycete, *Streptomyces avermitilis* sp, developed by Merck & Co. Inc. and launched commercially in 1981, was shown to be an effective drug for the treatment of onchocerciasis. Ivermectin is a very effective microfilaricide that kills 99% of microfilariae with a single treatment (APOC/ WHO, 2005). With the mandate of APOC to establish within a period of 12 to 15 years, effective and self-sustainable community- directed treatment with ivermectin throughout the endemic areas, within the geographical scope of the programme (APOC/WHO, 2005), it requires a clear understanding of the long-term compliance process in order to guide countries towards sustainability. According to projections by epidemiologists, it is believed that onchocerciasis could be controlled in endemic communities if 100% of eligible populations take their treatment regularly over a period of 10 to 15 years or more (Edungbola, 1991; Boussinesq *et al.*, 1997). With annual dose of ivermectin, it is estimated that 70% of target population would have to be treated, for the long-term project of elimination of the disease to be a reality (Dadzie, 1997). Compliance with annual ivermectin treatment therefore, has become a major challenge for APOC as it enters its second decade of implementation. Now that the original 25 projects which started in 1997 – 1998 have been operating for more than a decade, annual compliance studies have become possible. Such studies are extremely desirable since researchers are now pushing back the timeframe for annual ivermectin dosing from 15 to 25 or more years (Winnen *et al.,* 2002) and coverage rate from 65% to 80% (APOC/WHO, 2009).

To date, published reports of CDTI intervention have focused on coverage. While reports of population coverage are encouraging (Amazigo *et al.*, 2007), only few studies have centered on compliance to annual ivermectin treatment. Coverage rates in a community may not give the full picture of the programme success because there may be individuals or groups who systematically do not comply over the years and thus provide a continued focus for the disease transmission. Few unpublished reports have shown that in a good number of communities,

women are excluded from annual ivermectin treatment for various reasons (Elhassan *et al.,* 2007). Studies showing gender differences in coverage imply longer term problems with compliance (Brieger *et al*, 2002; Maduka *et al*., 2004). However, this question needs to be tested through properly designed research. The present study is designed to determine the rate of compliance to annual ivermectin treatment which has lasted for over 14 years in Abia State.

2. Materials and Methods

2.1. Study Area: The study was carried out in Abia State located in the rainforest zone of South eastern Nigeria and inhabited majorly by the Ibo ethnic group. The state is made up of 17 Local Government Areas (LGAS) with a population of 2,883,399 people according to 2006 census. Eight (8) of the seventeen LGAs in the State are endemic for onchocerciasis -2 hyper-endemic and 6 meso-endemic (Ukairo, 2008). The studied LGAs were selected based on hyper-endemicity with onchocerciasis.

Ivermectin distribution commenced in Abia State in 1995 as a combined effort of the State Ministry of Health, the Lions Club and the River Blindness Foundation. In 1996, the Carter Center's Global 2000 Programme assumed the River Blindness Foundation partner role. In 1998, Abia State began receiving APOC support and currently, the programme has lasted over 14 years.

2.2. Preliminary Survey and Advocacy: The pre-disease survey logistics included visits to the Local Government Chairman of the two LGAs (Umunneochi and Isuikwuato LGAs), the traditional rulers of the autonomous communities (4 communities from each LGA) and the village heads to explain the purpose of the survey and to solicit for co-operation.

2.3. Data Collection and Analysis: The study questionnaire designed to investigate the rate of compliance and reasons for absenteeism was administered to 558 individuals. A specially designed individual form was used to elicit information on the respondent's personal data. To elucidate the issue of recall bias in this study (since most people do not remember things easily beyond five years), treatment registers were used to compare the claims of respondents on number of times the drug was swallowed. Where treatment registers were not available or inadequate, the claims of the individuals were weighed with the report of CDDs.

2.4. Statistical Analysis

A well designed questionnaire was used to evaluate the rate of compliance to annual ivermectin treatment. The data obtained was expressed in percentages. This result was also expressed in a Bar chart for a quick appreciation of the data. Chi-square (X^2) technique was used to determine the level of significance of the demographic factors on compliance and the reasons for low compliance.

3. Results

Of the 558 individuals interviewed to ascertain their level of compliance, 306 (55.4%) had taken the drug before while 249 (44.6%) claimed they had not been treated before (Table 1). This result was also expressed in a Bar chart for a quick appreciation of the data (Figure 1). Despite the treatment over time, only 70 (22.7%) of those treated before were high compliers, that is, those who had been treated for 8 times and above. Two hundred and thirty nine (77.3%) of those treated before were low compliers. The overall percentage of high compliers in the sampled communities was only 12.6%. The result also revealed the age range of the individuals who claimed they had not taken the drug before (Table 2). Out of 249 individuals who had not taken the drug before, 90 (36.1%) are between the age bracket of 6-11 years; 51 (20.1%) fall between the age bracket of 12-24 years while 108 (43.4%) are 25 ye years and above.

Table 1: The Rate of Compliance to Ivermectin Treatment in the Sampled Communities

| Times swallowed	Community frequency								Total freq.	% freq.	
	Umuobiala	Amiyi Obilohia	Obiagu	Amiyiuhu	Mbala	Amuda	Amakpoke	Lokpanta			
0	23	17	22	56	24	13	24	70	249	44.6	
1	08	09	05	09	17	10	07	02	67	12.0	
2	12	10	04	06	15	06	07	01	61	10.9	
3	07	07	02	10	09	03	11	-	49	8.8	
4	03	04	-	01	10	06	02	-	26	4.7	
5	02	03	-	04	03	-	05	01	18	3.2	
6	02	-	01	03	02	01	01	-	10	1.8	
7	01	01	-	01	01	-	04	-	08	1.4	
8	01	02	-	03	-	-	03	-	09	1.6	
9	-	01	-	01	-	-	-	-	02	0.4	
10	01	-	01	06	02	-	01	-	11	2.0	12.6%
11	-	-	-	-	-	-	-	-	-	-	High compliers
12	01	01	-	-	02	-	-	-	04	0.7	
13	04	-	-	-	02	-	-	04	07	1.3	
≥14	-	08	01	-	19	03	06	-	37	6.3	
Total	65	63	36	100	106	42	71	75	558	100	
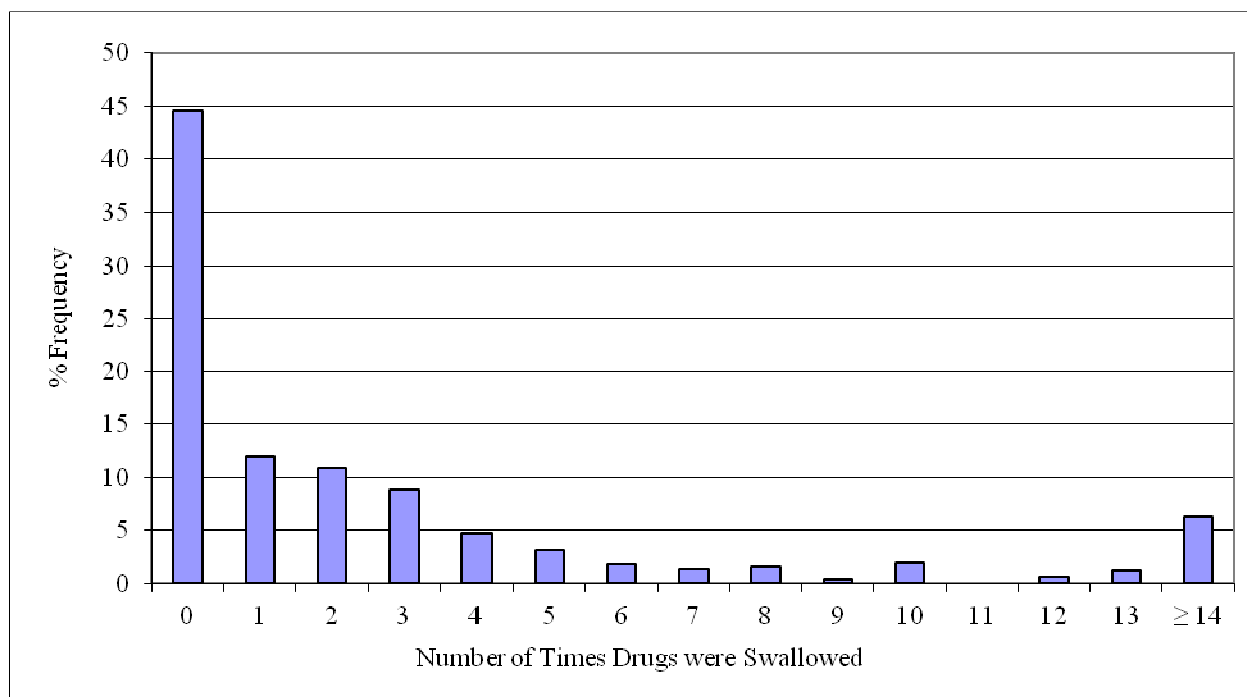
Figure 1: Compliance Rate Expressed in Bar Chart

Table 2: Age Range of Individuals who claimed they have not taken the Drug before

Age Range	Umuobiala	Amiyi Obilohia	Obiagu Uturu	Amiyiuhu	Mbala	Amuda	Amakpoke	Lokpanta	Total	Percentage (%)
6 – 11	6	13	3	26	6	6	9	21	90	36.1
12 – 24	7	3	10	7	5	3	7	9	51	20.5
25 and above	10	1	9	23	13	4	8	40	108	43.4
Total	23	17	22	56	24	13	24	70	249	44.6

The frequency of high compliers in the sampled communities shows that Mbala- Isuochi has a high compliance rate of 23.6%, Amiyi-Obilohia (19.0%), Umuobiala (10.8%), and Amiyiuhu (10.0%), while the least was Lokpanta with compliance rate of 1.3% (Table 3).

Table 3: Frequency of High Compliers in the Sampled Communities

Community	No sampled	Freq. of high compliers (8 to ≥ 14)	Percentage (%)
Umuobiala			
Amiyi-obilohia			
Obiagu-Uturu	65	07	10.8
Amiyiuhu	63	12	19.0
Mbala-Isuochi	36	02	2.8
Amuda-Isuochi	100	10	10.0
Amakpoke	106	25	23.6
Lokpanta	42	3	7.1
	71	10	14.1
	75	1	1.3

The effect of demographic factors on compliance (Table 4), revealed that 195 (34.9%) out of 558 individuals interviewed were males while 363 (65.1%) were females. Among these groups, 53.8% and 57.3% of the males and females respectively were treated before. Out of the 195 males and 363 females, only 25 (12.8%) males and 45 (12.4%) females were high complier. However, the Chi-square (X^2) analysis at 0.05 level of significance revealed that sex does not affect the rate of compliance to drug (i.e. $\chi^2_{cal.} = 2.41 < \chi^2_{tab.} = 11.34$). Stratifying by age, the result revealed that out of 558 individuals interviewed, 89 (15.9%) were between ages 6-11; 67 (12.0%) were between 12-24 years, while 402 (72.0%) were 25 years and above. Among the ages of 25 years and above, 289 (71.9%) had been treated before with 69 (17.2%) as high compliers. Among ages 12-24, only 8 (11.9%) had been treated before with 1(1.5%) as high complier. Among the 89 individuals between 6-11 years interviewed, only 18 (20.2%) had been treated before. The statistical analysis revealed that age has a great effect on the intake of drug and compliance (i.e. $\chi^2_{cal.} = 68.145 > \chi^2_{tab.} = 16.8119$). On education and levels of education, the result showed that education and levels of education do not contribute to any significant difference in the drug consumption within the demographic location under statistical investigation (i.e. $\chi^2_{cal.} = 7.14 < \chi^2_{tab.} = 16.8119$).

Table 4: Effects of Demographic Factors on Compliance

Factors		Sample number N=558	No. treated before and percentage (%)	No. of high compliers	% compliance	Yates χ^2 value, P
Sex	Male	195	105 (53.8)	25	12.8	$2.41 < \chi^2_{tab}$
	Female	363	208 (57.3)	45	12.4	
Age	6-11yrs	89	18 (20.2)	Nil		$68.145 > \chi^2_{tab}$
	12-24yrs	67	08 (11.9)	01	1.5	
	25 and above	402	289 (71.9)	69	17.2	
Education	None	174	125 (71.8)	23	13.2	$7.14 < \chi^2_{tab}$
	Primary	242	119 (49.6)	25	10.3	
	Secondary	142	67 (47.2)	14	9.9	

Table 5: Reasons for low compliance among community members

No	Reasons	o_i frequency	%	e_i	$\dfrac{(o_i - e_i)^2}{e_i}$
01	Seriously sick at home	09	1.6	8.928	0.00058
02	Pregnant at home	09	1.6	8.928	0.00058
03	Under age 5 at time	34	6.1	34.038	0.0000424
04	To short at time	01	0.2	1.116	0.012
05	Absent, away from village	111	20.0	111.6	0.0032
06	Side effect of ivermectin	18	3.2	17.856	0.00116
07	Don't take orthodox drug	=	=	=	=
08	Not informed	155	27.8	155.124	0.000099
09	Refused/ no reason	124	22.2	123.318	0.00377
10	Drug had finished	01	0.2	1.116	0.012
11	No distribution	96	19.7	109.926	1.764
	Total	558			1.797

Therefore $\chi^2_{cal} = 1.797$
Where $\chi^2_{tab} = 16.9190$

4. Discussion

Onchocerciasis control can be achieved through several years of high treatment coverage and compliance. However, compliance to annual ivermectin treatment has become a challenge as low compliance implies longer time of elimination and thus more cost effective. The result from this survey revealed that 44.6% of the communities sampled had not been treated before and only 12.6% were high compliers. Mbala-Isuochi that started treatment in 1991 has high compliance rate of 23.6% followed by Amiyi Obilohia (where microfilariae were identified) with 19.0% while the least was Lokpanta with compliance rate of 1.3%. The non-compliance and low-compliance groups may serve as a reservoir for continued transmission of onchocerciasis. Results from the demographic survey on households revealed that gender and level of education did not affect compliance. This could be as a result of health enlightenment and the benefits received or seen on those treated with ivermectin. This agrees with the report on compliance to annual ivermectin treatment by Elhassan *et al* (2007) in Kaduna State where gender and level of education did not affect compliance. However, age had a significant effect on compliance as the adults were mostly available for treatment while the youths were away in cities schooling or working. This is supported by an FGD participant who said that the elderly are more in the village while the youths travel outside for work. The level of compliance is also affected by side reactions following drug treatment. These side reactions include swelling of the body, discomfort, dizziness, fever, itching and sleepiness.

The major reasons for low compliance by respondents include "lack of information on the arrival of the drug", "no reason for refusal" and "absenteeism". Refusal to comply with annual ivermectin treatment could be attributed to lack of adequate information on the benefits of the drug and the fear for side reactions. A respondent stated clearly that his reason for refusal was the side effects he saw on others who took the drug. Absent, away from village was also identified as an important factor detrimental to compliance. Absent, away from village may be due to farming, where community members went to their farms very early and back very late and therefore could not be seen at home for treatment; or where people travel outside the village for work and other opportunities and miss annual distribution. Emukah *et al* (2004) also identified "absent, away from village'' as a major factor that contributed to low compliance to annual ivermectin treatment. It is therefore recommended that awareness should be created through health enlightenment campaign on the importance of compliance to annual ivermectin treatment. The treatment could be biannual to accommodate those absent from community during the previous treatment period. It is believed that the implementation of these suggestions will

not only improve compliance to annual ivermectin treatment but also boost the long-term compliance that will eventually eradicate onchocerciasis in Abia State, Nigeria.

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