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Willingness of Individuals to Comply with Annual and Long-term Ivermectin Treatment in Abia State, Nigeria

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Authors' contributions

Author ORE designed the study and wrote the first manuscript. Authors BEBN and CNU wrote the protocol and managed the analyses, while author ROE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This study was designed to document individuals' adherence to annual ivermectin treatment and people's willingness to continue taking ivermectin as an important predictor of sustained compliance with long-term ivermectin treatment. The study which was conducted between April and September, 2011 adopted a cross-sectional approach in collecting quantitative and qualitative data from the two Local Government Areas of Abia State that were assessed by REMO as hyper-endemic for onchocerciasis. The study population involved both high and low compliers groups. A Structured questionnaire was administered to 558 people to ascertain their compliance rate to annual and long-term ivermectin treatment and their willingness to sustain the treatment. Of these, 195 (34.9%) were males while 363 (65.1%) were females. Among these groups, 53.8% and 57.3% of males and females respectively were treated before. Of the 195 males and 363 females, only 25 (12.8%) males and 45 (12.4%) females were high compliers. On their willingness to continue with the drug, 483 (86.6%) claimed that most people take the drug, 495 (88.7%) affirmed that most people will continue with the drug while 555 (99.5%) indicated that they are personally willing to continue with the drug if made available. This is confirmed by the Chi-square (χ^2) analysis at 0.05 level of significance that people are personally willing to continue with the drug if available (χ^2_{cal} =163.585, *P-value* < 0.0001). Suggestions on ways to improve compliance to annual and

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long-term ivermectin treatment showed that health education/enlightenment ranked very high (78.3%). This is followed by “awareness through church/school” (77.5%). It is imperative that the existing health education materials be reviewed by taking into cognizance such factors that will improve individual’s willingness to comply with annual and long-term ivermectin treatment. Such materials should emphasize compliance among youths and children 5 years and above.

Keywords: Improve compliance; annual ivermectin treatment; willingness to treatment; factors affecting compliance.

1. INTRODUCTION

The establishment of African programme for onchocerciasis Control (APOC) in 1995 with the mandate 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 [1], 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 [2,3]. With one annual dose of ivermectin, it is estimated that 70% of the target population would have to be treateds for the long-term project of elimination of the disease to be a reality [4].

The current mainstay of onchocerciasis control is chemotherapy, using ivermectin alone or in small and isolated foci combined with vector elimination. Currently, over 68 million people are being treated with a single annual dose of ivermectin every year in Africa [5]. In CDTI, community ownership of the ivermectin–treatment programme is emphasized, with endemic communities themselves involved in the planning, implementation, coordination and monitoring of all treatment activities [6]. As an annual dose of ivermectin does not permanently interrupt transmission of the parasite that causes onchocerciasis, distribution of the drug will probably have to be repeated for many years, even if high treatment coverage are achieved and sustained [7]. Compliance with annual ivermectin treatment has become a major challenge for APOC as the original 25 projects which started in 1997/1998 have been operating for over a decade. Annual compliance studies have become possible and extremely desirable, since researchers are now lengthening the timeframe for annual ivermectin dosing from 15 to 25 or more years [8], and the coverage rate from 65% to 80% [9]. To date, published reports of CDTI intervention have focused on coverage. While reports of population coverage are encouraging [10], only few studies have centered on compliance to annual ivermectin treatment. Coverage rates in a community may not give the full picture of the success of the programme, 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. Such low compliance group needs to be properly informed on the need to comply with annual ivermectin treatment necessary for total elimination of the disease. This study highlights the factors that necessitate individual’s willingness to comply to annual and long-term ivermecctin treatment and suggests ways to improve this compliance.

2. METHODOLOGY

2.1 Study Area

The study was carried out in Umunneochi and Isuikwuato LGAs of Abia State, Nigeria, assessed by Rapid Epidemiological Mapping of Onchocerciasis (REMO) as being hyper-endemic for onchocerciasis. Abia State is bordered on the north and northeast by Ebonyi and Enugu States respectively and on the east by Cross River and Akwa Ibom States. Its southern border is shared with River State while its western border is shared with Imo and Anambra states. The people of Abia State are part of "Ibo" ethnic group and are known like their kinsmen to be highly mobile. They are very dynamic and are predominantly farmers, artisans and civil servants. The people are united and speak "Igbo" language as a common language, though several dialects exist. Other ethnic groups also reside with the dominant Igbo speaking people. Abia State falls within the rain forest zone. The topography is undulating with hills and valleys hence susceptible to gully erosion. The area is large and terrain very difficult. The area has fast-flowing Imo River with its tributaries and many streams such as Iyi-ukwu and Ihuku that serve as breeding sites for the black fly.

The State is made up of 17 Local Government Areas (LGAs) with a population of 2,883,399 according to 2006 census. Eight of the seventeen LGAs in the State are endemic for onchocerciasis (2 hyper-endemic and 6 meso-endemic LGAs) (Ukairo N. Annual Project Technical Report on Abia CDTI Submitted to Technical Consultative Committee of African Program me for onchocerciasis Control, 2008). Onchocerciasis control programme started in the State with Mbala-Isuochi as pilot site in1991. In 1998, the State submitted a proposal to African programme for Onchocerciasi Control (APOC) for the control of onchocerciasis through the use of the community-directed treatment with ivermect (CDTI) strategy. The proposal was approved and CDTI commenced fully in all the LGAs of the State with Global 2000 River blindness programme (GRBP) serving as the support NGDO. The programme has lasted for over seventeen years and needs to be evaluated.

2.2 Study Design

The study was designed to assess the rate of compliance to annual ivermectin treatment which has lasted for over 17 years and the factors that can influence individual's willingness to continue the treatment for the foreseeable future. The study participants were individuals between ages 6 and above who were resident in the area. The participants were grouped into two: the low compliers group comprising of those who had taken ivermectin for less than 8 years and high compliers group comprising of those who had taken ivermectin for 8 years and above. The cross-sectional approach was adopted through collecting quantitative and qualitative data from the two Local Government Areas in Abia State that were assessed by REMO as hyper-endemic for onchocerciasis. A specially designed individual form was used to gather information for respondent's personal data. The personal data information included the following: household name/code, age, sex, marital status, educational status, occupation, village/village code, community, LGA and the number of years the individuals are resident in the village.

2.3 Ethical Clearance

Ethical review and clearance of the research protocol, research instruments and informed consent procedures were obtained from the Ethical Review Committee of the Department of

Animal and Environmental Biology, Imo State University, Owerri. The approval for the survey was obtained from Abia State Ministry of Health.

2.4 Preliminary Survey and Advocacy

The pre-disease survey logistics involved mobilization of the community-directed distributors (CDDs) and other village-based field assistants who were involved in the distribution of the drug. The communities selected on the basis of their hyper-endemic status are currently being treated with ivermectin.

2.5 Epidemiological and Social Science Method of Data Collection

Epidemiological and social science methods of data collection were used to collect data on the study objectives and research questions. The study lasted from April to September, 2011. Individuals (seven men and seven women) who volunteered and have been living in the community for over 8 years formed the Focus Group Discussion (FGD) participants. The rate of compliance was determined on the number of times the drug (ivermectin) was swallowed. Individuals who had taken the drug for less than eight times were regarded as low compliers while high compliers were those who had taken the drug for eight or more times.

2.6 Data Collection

A well structured questionnaire was used to collect information from the community members, community-directed distributors (CDDs), and community leaders on compliance rate and their willingness to continue the treatment. Since most of the participants were illiterate, the recruited field assistants assisted the participants in completing the questionnaires. The sample size was estimated using Krejcie and Morgan [11] formula for determining sample size for research activities.

$$S= X^2NP (1-P) / d^2 (N-1) + X^2P (1-P) \text{ where N (population size) = 116,749.}$$

Eight hundred and twenty questionnaires were distributed with 558 properly filled and returned. 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 reports of the CDDs.

2.7 Statistical Analysis

Chi-square (χ^2) analytical technique was employed to ascertain the effect of demography on compliance and the level of willingness of community members to continue ivermectin treatment. Bar Chart was used to allow for quick appreciation of the suggestions to improve annual and long-term ivermectin compliance.

3. RESULTS

The effect of demographic factors on compliance rate from household survey is shown in Table 1. Out of 558 individuals interviewed, 195 (34.9) were males and 363 (65.1%) were

females. Among these groups, 53.8% and 57.3% of 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 compliers. The Chi-square (χ^2) analysis at 0.05 level of significance revealed that sex does not affect the rate of compliance to drug (i.e.$\chi^2_{cal.}$ =0.615; *P-value*=0.433.

Table 1. 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-value
Sex	Male	195	105 (53.8)	25	12.8	. χ^2_{cal} =
	Female	363	208 (57.3)	45	12.4	0.615 P-value = 0.433
Age	6-11yrs	89	18 (20.2)	0	0.0	. χ^2_{cal} =
	12-24yrs	67	08 (11.9)	1	1.5	140.486, P-value
	25 and above	402	289 (71.9)	69	17.2	<0.0001
Education	None	174	125 (71.8)	23	13.2	χ^2_{cal} =
	Primary	242	119 (49.6)	25	10.3	26.723
	Secondary	142	67 (47.2)	14	9.9	P-value <0.0001

Stratifying by age, the results revealed that out of 558 individuals interviewed, 89 (15.9%) were between ages 6-11 years, 67 (12.0%) were between ages 12–24 years, while 402 (72.0%) were 25 years and above. Among the ages 25 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 only 1 (1.5%) high complier. Among the 89 between ages 6-11 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. χ^2_{cal}=140.486; *P-value* < 0.0001). On education and levels of education, result obtained shows that education and levels of education contributed significantly to the consumption of the drug within the demographic location under statistical investigation (i.e.χ^2_{cal}=26.723; *P-value*<0.0001).

On the willingness to continue with ivermectin treatment by most individuals Table 2, 483 (86.6%) out of 558 indicated that most people take the drug; 495 (88.7%) affirmed that most people will continue with the drug while 555 (99.5%) said that they are personally willing to continue with the drug if made available. The *P-value* of 0.0000 against 0.05 level of significance indicates that the factors of study, “willingness to take ivermectin and response”, are not independent.

Table 2. Willingness to continue ivermectin treatment among individuals

Willingness to take drug	Response		
	Yes (%)	No (%)	Don’t know (%)
Most people take	483 (86.3)	49 (8.8)	26 (4.7)
Most people will continue	495 (88.7)	0	63 (11.3)
Personally willing to continue	555 (99.5)	0	3 (0.5)

Suggestions on the ways to improve compliance to annual ivermectin treatment in order of priority are shown in Fig. 1. They are "health education/ enlightenment" (78.3%), "awareness through church/school" (77.5%), "house-to-house distribution" (65%) and support CDDs (63.3%).

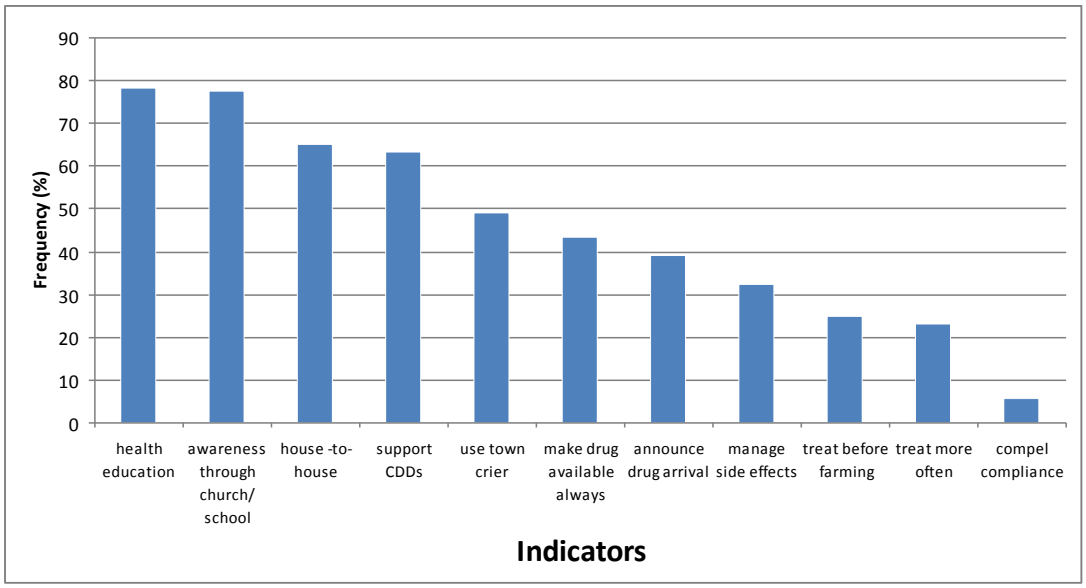

Fig. 1. Suggested ways to improve compliance to annual and long term ivermectin treatment

4. DISCUSSION

Results from the demographic survey on households revealed that gender did not affect compliance; however age and the levels of education had great effect on compliance. Findings from the survey revealed that the elderly who were mostly illiterate were available for treatment while the literate adults and youths were away in cities working or schooling. This is supported by a Focal Group Discussion (FGD) participant who said that the elderly are more in the village while the youths travel outside for work.

The study also revealed that most people have knowledge of the drug, hence most of the respondents indicated that "most people take the drug" and are willing to continue. More people are willing to take ivermectin than before because the community distributors are part of the community and understand their people better. It is important that government ensures that the drug is available and procured early for distribution. Almost every person interviewed (99.5% of the respondents) said that they are personally willing to continue with the drug as long as the drug is available. It is important that these individuals who are personally willing to take the drug maintain the annual treatment if they desire complete eradication of the disease.

Suggestions were made on how to improve annual and long-term compliance by respondents. From the findings, "health education/enlightenment" ranked very high (78.3%). This is followed by "awareness through church/school" (77.5%), "house-to-house

distribution" (65%) and "support CDDs" (63.3%). Health education was recommended as one of the main strategies towards improving treatment [12]. It becomes imperative that the existing health education materials should be reviewed by taking into cognizance those factors associated with low compliance as well as perceptual factors like benefits of treatments and seriousness of the problem of onchocerciasis. Health education materials should emphasize compliance, particularly among youths and children (5 years and above). Biannual treatment is recommended as a catch up round only for those who missed the previous round. It is believed that the implementation of these suggestions will not only improve annual compliance to ivermectin treatment but also boost the long-term compliance that will eventually eradicate onchocerciasis in Abia State.

5. CONCLUSION

The findings showed there was a low frequency of high compliance. A compliance rate of 12.8% and 12.4% were obtained for males and females respectively. Gender did not affect compliance to annual ivermectin treatment while age and levels of education had significant effects on compliance. The study also showed that most people take the drug (ivermectin) and individuals are personally willing to continue with the drug if available. On suggestions for improvement on compliance, "health education/enlightenment" and "awareness through school/church" ranked very high. However, health education materials should be reviewed to emphasize compliance among youths and children (5 years and above).

CONSENT

All authors declare that 'written informed consent' was obtained from the participants for the publication of this case report.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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