

Effects of Onchocerciasis Manifestations on Academic Performance

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Abstract

A study of the effects of various manifestations of onchocerciasis namely visual impairment, onchocerciasis (papular oncodermatitis) and palpable nodules on academic performance was undertaken with the objective of finding out the manifestation with the most serious negative effect on academic performance. The study was carried out in Uzo-Uwani Local Government Area of Enugu State, Nigeria between May, 1998 and May, 1999 using the twelve secondary schools in the area. The data on onchocerciasis manifestations were collected by examining randomly selected students from each school while the academic performance of each school was assessed by calculating the weighted average performance of each school using 5-year (1994-1998) Junior Secondary School Certificate results collected from Examinations Development Centre, Enugu. A linear regression analysis was performed between performance and each manifestation of onchocerciasis examined. The results of the analysis showed that visual impairment had the most profound negative effect on academic performance with correlation coefficient $r \sim -0.72$. The presence of oncho-rashes and the presence of nodules, on the other hand, had no negative effects on academic performance (with correlation coefficient $r \sim 0.083$ and 0.33 respectively). The implication of the result is that the higher the rate of visual impairment in a school, the poorer the academic performance of such a school. In view of this, it is recommended that every effort be made to prevent impairment of vision in onchocerciasis, which gradually leads to irreversible onchocercal blindness. Such efforts should include a more effective distribution of ivermectin (Mectizan) in order to reduce the parasite reservoir in man, and also breaking the man-fly contact either by use of repellents or through proper covering of the body during outdoor activities.

Key Words: Onchocerciasis, manifestation, academic performance, weighted average, visual impairment.

Introduction

Onchocerciasis is a chronic parasitic disease caused by the filarial nematode, *Onchocerca volvulus* and is transmitted by different species of blackflies (*Simulium*) in different parts of the world. In West Africa, the disease is transmitted by *Simulium damnosum* complex. Onchocerciasis is a widespread filarial disease that produces grave socio-economic effects. The impact of the disease in social, economic and cultural terms has been shown to be enormous as it affects the productivity, social and sexual lives of the sufferer due to blindness and other debilitating effects (Nwoke, 1990). According to WHO (1980), onchocerciasis is a major cause of blindness in parts of Africa and is a serious obstacle to socio-economic development. The disease is characterized by dermatologic, ophthalmologic, lymphatic and systemic manifestations. Blindness and impaired vision are the major and most dangerous disabilities associated with the disease (Nwoke, 1992, Nwoke and Ikonne, 1993), and are more prevalent among endemic communities living around the foci of transmission (fast flowing rivers) (Nwoke and Ikonne, 1993). In an individual, the severity of ocular onchocerciasis is known to be associated with the intensity of infection (Anderson *et al.*, 1976)

There have been various reports on the effects of onchocerciasis on productivity but most of these have been on its effects on farming. (Hamon and Kartman, 1973; Bradley, 1976; Vajime, 1982; Nwoke, 1990 and Workneh *et al.*, 1993). The present study was on the effects of different manifestations of onchocerciasis including visual impairment, oncho-rashes and palpable nodules, on academic performance. The objectives of the study were

- ❑ to discover the manifestation of onchocerciasis with the most serious negative effect on academic performance and
- ❑ to make recommendations on how best to prevent such a manifestation based on the findings.

Materials and Methods

The Study Area

The study area was Uzo-Uwani Local Government Area of Enugu State, Nigeria. The area consists of 16 communities divided into four health districts namely:

- (i) Umulokpa district consisting of Umulokpa (headquarters), Nkume, Adaba and Ukpata
- (ii) Nkpologu district made up of Nkpologu, Uvuru and Akpugo
- (iii) Ogboli district comprising Adani, Asaba, Igga, Ojor and Ogurugu
- (iv) Nimbo district consisting of Nimbo, Abbi, Ugbene-Ajima and Nrobo.

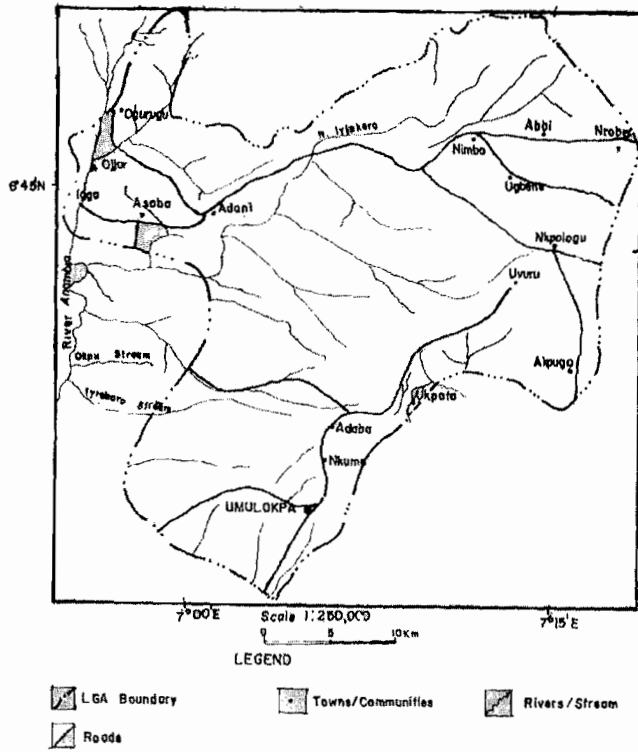


FIG. 1. MAP OF UZO-UWANI L.G.A SHOWING THE STUDY AREA.

Uzo-Uwani Local Government Area (Figure 1) lies between longitude 6° 55' and 7° 20' East and between latitude 6° 30' and 7° 00' North. It belongs to the forest-savanna-mosaic zone of Nigeria (Crosskey, 1981). The rivers and streams that traverse the area belong to the Anambra River system, which had been identified by Crosskey (1981) as part of the breeding sites of *Simulium damnosum* (blackfly) in Eastern Nigeria. Majority (about 90%) of the communities in this Local Government Area are rural communities without electricity and pipe-borne water. The inhabitants of this area engage in agriculture as their major economic activity. The level of engagement in farming activities is so high that almost every adult, including civil servants, is involved. The communities in this area were found to be endemic for onchocerciasis (Ubachukwu, 2001), using the indices recommended by Edungbola *et al.*, (1993) for Rapid Assessment Method (RAM), namely presence of palpable nodules and leopard skin. The nodule rate was found to be 20.0% in the area; 23.7% among the males and 14.5% among the females while the prevalence rate of leopard skin was found to be 5.9%; 7.2% among the males and 4.1% among the females.

The Study Population and Study Sample

The study population consists of all the twelve secondary schools in the study area namely: Boys' Secondary School, Akiyi-Umulokpa; Girls' Secondary School, Umulokpa; Attah Memorial High

School Adaba; Community Secondary School, Ukpata; Uvuru Secondary School, Uvuru; Adada Secondary School, Nkpologu; Uzo-Uwani Secondary School, Adani, Community Secondary School, Igga; Community Secondary School, Ogurugu; Community Secondary School, Nimbo; Community Secondary School, Abbi-Ugbene and Community Secondary School, Nrobo.

A total of four hundred and seventy nine (479) students from the twelve secondary schools in the study area were randomly selected for the study. The sample had a good representation of both sexes made up of two hundred and seventy three (273) males and two hundred and six (206) females.

Data Collection

The selected students were physically examined for various manifestations of onchocerciasis and the necessary records taken. In addition, five-year (1994-1998) Junior Secondary School Examination results for the twelve schools in Uzo-Uwani Local Government area were collected from Examinations Development Centre (EDC), Enugu,, for analysis to check for any dependence of various manifestations of onchocerciasis namely presence of visual impairment, dermatitis and palpable nodules on academic performance. Furthermore, a few teachers and students were orally interviewed on their perception of the effects of the various manifestations investigated on the performance of school children.

Other potential factors such as socio-economic environment, quality of teachers \students and available infrastructure such as laboratory, library and boarding facilities, which were expected to influence academic performance were considered to be more or less similar in the different schools. This is because these communities can be said to have similar socio-economic environment, all being situated in rural communities without electricity and pipe-borne water; all the schools were day schools; the libraries and laboratories were similarly equipped and the teachers teaching Junior Secondary 3 had at least minimum of Nigerian Certificate of Education (NCE). Specialized subjects such as Introductory Technology and Fine Arts were not used in the study. In addition to these checks, a large sample population and performance over 5 years were used to remove other biases inherent in the sample units.

Data Analysis

The prevalence rates of each onchocerciasis manifestation examined (visual impairment, dermatitis and nodules) were recorded for each school. To analyse the academic performance of each school in the Junior Secondary School Certificate, a weighted average performance was calculated for each school for the 5-year period under consideration using seven core subjects namely English Language, Mathematics, Integrated Science, Social Studies, Religious and Moral Education, Igbo and Agricultural Science. The examination scores for each of these subjects were weighted as follows: A was assigned 6 points, C had 4 points, P had 2 points while F had zero point. A linear regression analysis was performed to check for correlation between academic performance and the different variables (impaired vision, dermatitis and nodules).

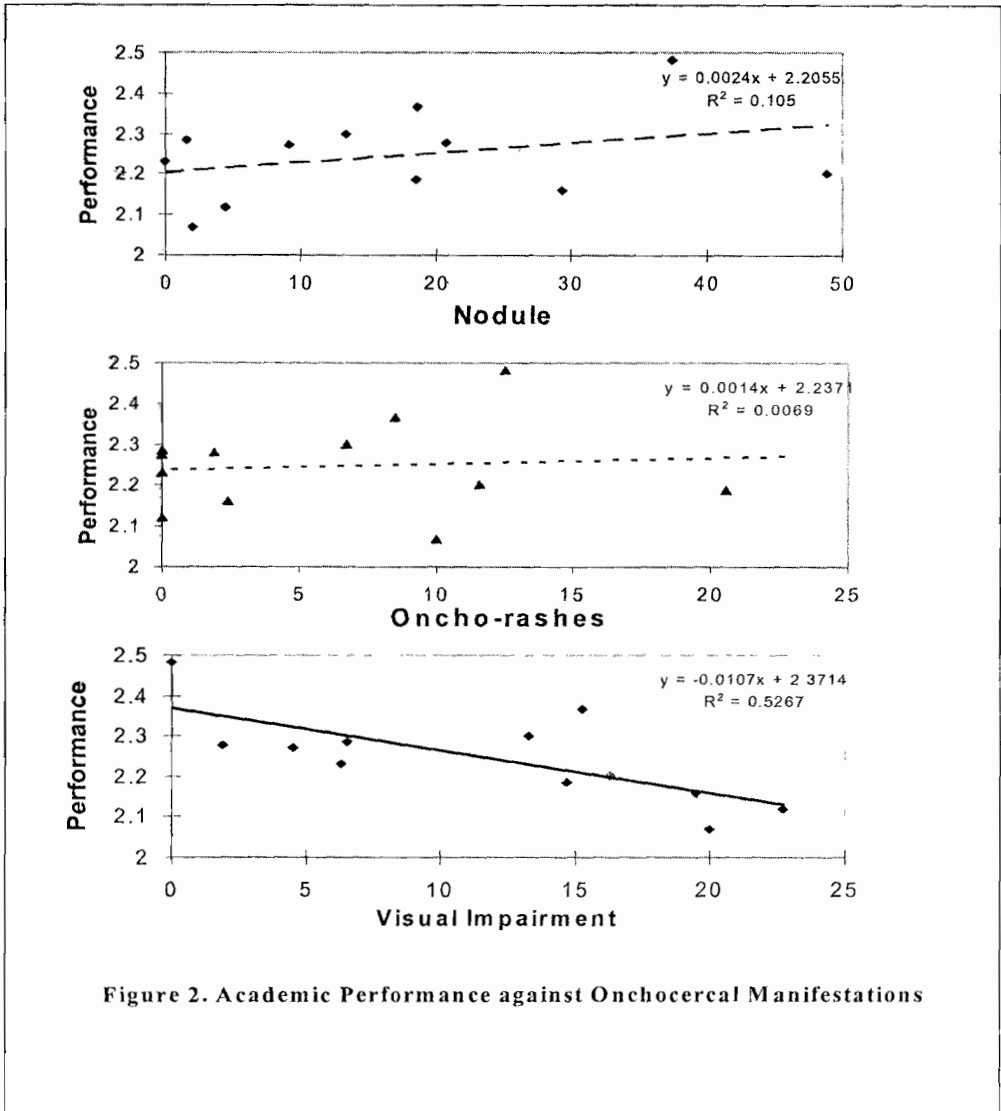
Table 1. Prevalence rates of visual impairment, rashes and palpable nodules in secondary schools in Uzo-Uwani Local Government Area of Enugu State.

	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL	M	F	TOTAL
Uzo-Uwani Sec. Sch., Adani	35	15	50	11(31.4%)	0(0.0%)	11(22.2%)	2(5.7%)	3(20.0%)	5(10.0%)	1(2.9%)	0(0.0%)	1(2.0%)
2. Comm. Sec. Schi. Nrobo.	12	10	22	5(41.6%)	0(0.0%)	5(22.7%)	0(0.0%)	0(0.0%)	0(0.0%)	1(8.3%)	0(0.0%)	1(4.5%)
3. Uvuru Sec. Schi. Uvuru	24	17	41	4(16.7%)	4(23.5%)	8(19.5%)	0(0.0%)	1(5.9%)	1(2.4%)	9(37.5%)	3(17.6%)	12(29.3%)
4. Comm. Sec. Schi. Ukpata	18	16	34	2(11.1%)	3(18.8%)	5(14.7%)	1(5.6%)	6(37.5%)	7(20.6%)	4(22.2%)	5(31.3%)	9(26.5%)
5. Adada Sec. Schi. Nkpologu	24	19	43	1(4.2%)	6(31.6%)	7(16.3%)	1(4.2%)	4(21.1%)	5(11.6%)	13(54.2%)	5(31.3%)	21(48.8%)
6. Comm. Sec. Schi. Igga	11	9	16	1(9.1%)	0(0.0%)	1(6.3%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
7. Comm. Sec. Schi. Abbi-Ugbene	28	16	44	2(7.1%)	0(0.0%)	2(4.5%)	0(0.0%)	0(0.0%)	0(0.0%)	4(14.3%)	0(0.0%)	4(9.1%)
8. Boys Sec. Schi. Akivu-Umulokpa	53	-	53	1(1.9%)	-	1(1.9%)	1(1.9%)	-	1(1.9%)	11(20.6%)	-	11(20.6%)
9. Girls' Sec. Schi. Umuokpa	-	62	62	-	4(6.5%)	4(6.5%)	-	0(0.0%)	0(0.0%)	-	1(1.6%)	1(1.6%)
10. Comm. Sec. Schi. Nimbo	37	22	59	7(18.9%)	2(9.1%)	9(15.3%)	5(13.5%)	0(0.0%)	5(8.3%)	9(24.3%)	2(9.1%)	11(18.6%)
11. Comm. Sec. Schi. Ogurugu	10	5	15	2(20.2%)	0(0.0%)	2(13.3%)	1(10.0%)	0(0.0%)	1(6.7%)	2(20.0%)	0(0.0%)	2(13.3%)
12. Attah Mem. High Schi. Adaba	21	19	40	0(0.0%)	0(0.0%)	0(0.0%)	5(23.8%)	0(0.0%)	5(12.5%)	11(52.4%)	4(21)	15(37.5%)
Total	273	206	479	76(13.2%)	19(9.2%)	55(13.4%)	17(6.3%)	13(6.3%)	36(6.3%)	65(23.8%)	23(11.2%)	88(18.4%)

Results

The prevalence rates of the various manifestations of onchocerciasis considered in the twelve secondary schools are shown in Table 1.

Out of four hundred and seventy-nine students examined from the twelve schools in the area, 55 (46 males and 19 females) were positive for visual impairment; 30 (17 males and 13 females) were positive for rashes while 88 (65 males and 23 females) had palpable nodules.



The results of the regression analysis showing relationship between academic performance and various onchocerciasis manifestations are shown in Figure 2 above.

A strong negative correlation between performance and visual impairment was found with correlation coefficient ($r \sim -0.72$) while there was a mild positive correlation ($r \sim 0.33$) between performance and prevalence of palpable nodules and almost no correlation with dermatitis ($r \sim 0.083$).

Discussion

In this study, it was shown that performance of school children, as in other aspects of productivity such as farming in the study area (Ubachukwu and Anya, 2001) depended largely on the manifestations of onchocerciasis in their various communities. This finding is reasonable considering the debilitating effects of the disease especially as it relates to itching/dermatitis and visual impairment in the highly endemic areas (Nwoke and Ikonne, 1993, Workneh et al 1993). It can be acknowledged also that socio-economic environment, quality of teachers/students and available infrastructure such as laboratory, library and boarding facilities are other potential factors which may affect academic performance. However, the communities in the study area are largely rural communities whose major economic activity is farming. They have rivers, streams and/or springs as their source of water and with the exception of Adani, all the communities have no electricity. It can thus be said that these communities have similar socio-economic environment which might likely influence school performance in approximately the same way. For teachers, the minimum qualification for teaching in secondary schools is Nigerian Certificate of Education (NCE). Subject specialization is important at the Senior Secondary School level but not critical at the Junior Secondary School level being used for this study (except for Introductory Technology and elective subjects such as Business Education, Fine Arts and Home Economics, which were not included in the study). The quality of teachers, therefore, should be considered very similar in the communities. On the availability of infrastructure, all the schools are day schools without boarding facilities. Other facilities such as laboratories and libraries are of similar standards. It should be expected that these infrastructures would affect students' performance in a more or less similar way. It should be noted that JSSCE results used in the present analysis spanned 5 years and provided as large a sample size as possible so that dispersion of the distributions would be smoothed out as much as possible. Besides, the standardization of the results is expected to reduce further any residual dependence of performance on individual student's ability.

The results of the studies on the effects of onchocerciasis on school academic performance in a standard examination (JSSCE) showed that onchocerciasis manifestation with profound negative effect on school performance is visual impairment. The results of the regression analysis showed strong inverse correlation ($r \sim -0.72$) between performance and visual impairment. The implication of this is that the higher the prevalence of visual impairment in a school, the poorer the academic performance.

The result of this study is very significant because it has been reported by many authors (Hamon and Kartman, 1973; Bradley, 1976, Vajime, 1982; Nwoke, 1990 and Workneh et al, 1993) that visual impairment and blindness are the most serious manifestations of onchocerciasis but the reports have been mostly on their effects on farming in particular. The result of the present study has shown that the problem of visual impairment is as important in academic performance as in other aspects of productivity. The result was also supported by the responses from school children and

teachers orally interviewed during the study. According to them, the most serious manifestation of human onchocerciasis as far as the teaching / learning process is concerned is visual impairment. The presence of dermatitis gives some discomfort through itching and scratching which can result in lack of concentration while the presence of palpable nodules is not directly disturbing except through the resultant rashes followed by itching and scratching.

In conclusion, onchocerciasis is a parasitic disease with serious public and socio-economic implications just as shown in the present study.

It is notable that the World Health Organization under the African Programme for Onchocerciasis Control (APOC) in collaboration with the zonal Ministry of Health and non-governmental development organizations (Global 2000 for Uzo-Uwani Local Government Area) has been undertaking free distribution of ivermectin (Mectizan) in the study area since 1996 in order to reduce the reservoir of microfilariae in man. A more effective distribution of this drug of choice against the disease is recommended in order to save many students from irreversible visual impairment, which is the major manifestation of onchocerciasis that adversely affects academic performance. There is also need for enlightenment on onchocerciasis in order to encourage the people of this area to take this freely distributed drug, and also advise them to either cover themselves or use repellents against the *Simulium* flies during outdoor activities. This will help to save these youths from irreversible blindness that will ruin their future.

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