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Evaluation of Ascariasis Infection in Rural Communities Near Abeokuta, Nigeria

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Abstract: An evaluation of ascariasis was investigated in six rural communities (Idi-Ori, Dega-Eruku, Tolato, Ika-Ajibefun, Aka/Kipe and Akiode) near Abeokuta, Nigeria. Faecal examination, structured questionnaires and physical observations were used to determine prevalence, burden of disease, knowledge, attitude and practices of the 619 respondents in the study areas. Males 334 (54%) were more than females 285 (46%) across the communities. Age groups observed were 31 years and above (34.5%), 1-10 years (27.5%), 21-30 years (25.1%) and 11-20 years (12.9%). The study revealed a very high prevalence of infection (96-100%) in all the communities, but with low intensities. Both prevalence and intensity were not significantly affected by the differences in age groups and sex ($p>0.05$). Sanitary behaviour showed that respondents preferred the bush as sites for defaecation (91.8%) and disposal of wastes (92.2%), respectively. Sources of drinking water are mainly stream/pond (65.6%), borehole (28.1%) and deep well (6.3%). Mean analysis of the effect of infection burden (64.72±15.28) showed that ascariasis had very serious effect on their daily activities. Inability to go to farm (54.90±10.96), was identified as the highest burden, followed by inability to go to market (25.30±5.44) and inability to go to school (19.81 ± 10.38). T-test analysis revealed a significant difference between infection status and socio-economic activities (inability to farm $t=12.260$, $p=<0.005$, inability to go to school $t=4.670$, $p=<0.005$ and inability to go to market $t=11.382$, $p=<0.005$). Most respondents revealed that infection status exceeded five months. The level of assistance received during infection, only showed a correlation relationship of r ' 0.838, at $p'<0.005$ between the infected individual and his/her spouse. Forty percent of the respondents utilised orthodox treatment, as opposed to 29.7% that utilized herbal treatments. 45.3% of the respondents can only afford the sum of N50.00 for treatment, followed by 9.6% that can afford N51-N100, while 36.6% of respondents are not willing to pay. The lack of willingness to pay for treatment may also be attributed to the ignorance nature of the effects of ascariasis and the economic profile of the respondents, who are mainly farmers. These could also be main contributory factor to the continued prevalence of intestinal helminths in these areas.

Key words: Ascariasis, prevalence, evaluation, rural communities, Abeokuta

INTRODUCTION

Gastrointestinal helminthiasis including ascariasis a major disease condition constitutes a major health problem in developing countries including Nigeria. Helminths rank among the most prevalent of human infections responsible for disability, morbidity and mortality[1-6] particularly in populations where ignorance, poor water supply and unhygienic practices contribute to spread of helminth infection.

Crompton[7] had estimated that 1,472 million persons harbour *A. lumbricoides*, 1,298 million are infected with Hookworm and about 1,049 million have *Trichuris trichiura* globally. Such estimates of disease burden, even though impossible to make with complete accuracy, are extremely important because they can be used for decision making and intervention programmes[8].

Disease burden which is an important measure of the degree of morbidity and mortality in a given population measures the dimension of the health problem and the component of years lived with morbidity and mortality in a given population by using a summary measure to provide a quantitative measurement of health status[9]. However, in sub-Sahara Africa, there is little information on the extent of disease burden of rural dwellers due to Ascariasis, this Mafe[10] opined could mainly be that health related researches are focused in areas where there are existing government interests, most of which are either infants or mothers' related diseases.

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The usefulness of questionnaires and parasitological parameters for making inquires into health problems of people are well recognised and it has proved useful in studies of self-reported morbidity by school childless in Ghana, Mozambique and Tanzania[11] and Cote d'Ivoire[12].

The present analysis uses questionnaire data in addition to parasitological parameter to evaluate the prevalence and burden of ascariasis infection in rural communities with a view to providing knowledge for intestinal parasite control programme

MATERIALS AND METHODS

The study was carried out in six rural communities within Abeokuta geographic areas namely: Idi-Ori, Dega-Eruku, Tolato, Ika-Ajibefun, Aka/Kipe and Akiode which lie around latitude 7°6'N and 3°16E in the rainforest belt of Nigeria. Members of the communities, which are of the Yoruba Nationality, are mainly farmers and traders. Earth roads interlink the communities. They lack basic amenities such as electricity supply, pipe borne water (except Idi-ori) and adequate facilities for refuse and sewage disposal. A Primary Health Centre (PHC) exists at Idi-ori, which also serves neighbouring communities.

The objectives of the study were explained to the Health officer in charge of the primary health centre and the village chiefs, who in turn gave their consent for the study to commence. An enumeration was made of all persons 1 year and above in each community, using the already existing Primary Health Care (PHC) numbers on each house. For each household, the name, age, sex and marital status of each person were recorded. In all, the total population of each village was as follows: Idi-Ori-283 (having 39 clustered houses), Dega-Eruku-215 (30 houses), Akiode-132 (21 houses), Ike Ajibefun-121 (23 houses), Tolato 109 (17 houses) and Aka/kipe 87 (14 houses).

A tota l of 619 (65%) persons out of the total population of 947 persons participated in the study. Stool samples were collected from 619 persons (Idi-Ori (160),-Dega-Eruku (139), Akiode (90), Ika-Ajibefun (90), Tolato (70) and Aka/Kipe (70) and examined under the microscope for *Ascaris* ova, using the quantitative Kato thick smear[13]. The egg per gram (epg) of faeces was then calculated after adjusting for age and consistency[14].

Knowledge on health education and disease burden: Structured questionnaires requiring information (interpreted in the local language) such as occupation, type and usage of excreta facility at home were administered to all 619 respondents, in addition to focus group discussions and direct observations. The study was conducted early in the morning and late in the evening due to the fact that most of the population are farmers and traders who are at work between 8 am to 6 pm. All participants were encouraged to express their feelings, ideas, perceptions and opinions freely (Parents assisted in responding to questions for children between ages 1 to 9 years). Other information requested were causes of worm infection in addition to treatment methods. Personal observations on the availability of toilet facilities and the level of sanitation and sanitation related practices were noted in all the communities visited.

Data analysis: EPI Info version 2000 employing simple percentiles were used in analyzing the questionnaires. SPSS software version 10 was used to determine the prevalence and intensity by age-group and sex. Students T-test and correlation analysis were employed in establishing the relationship between burden of infection and socioeconomic activities.

RESULTS

The prevalence and intensity of Ascariasis in the villages are presented in Table 1. Prevalence ranged from 96 to 100% while mean intensity (epg), though low, varied from village to village. Table 2 shows the intensity of infection by age and sex, No significant differences was observed between the age-groups and sexes in all the villages ($p>0.05$). Also, when the age groups were stratified by sex, no significant difference was observed ($p>0.05$).

Demographic status and sanitation conditions: Analysis of questionnaires receivedTable 3, indicated the ratio of male (334) and female (285) respondents in the study population, their age groups, marital status and educational status/level of the respondents. On the sanitary and personal hygiene of respondents, the study observed that majority (92.2%) of the respondents across the communities dispose off their wastes in the bush while 7.8% of the respondents use the refuse sites. 91.8% of the population claimed that they do not have toilet facilities and so defaecate in open field or bush, while 6.0 and 2.2% utilize the refuse site and pit latrine,

Table 1: Prevalence and mean intensities of *Ascaris lumbricoides* in the communities

Village	No. examined	% infection	Mean intensity (epg)
Idi-Ori	160	100	2878.04±720.8
Dega-Eruka	139	97	2251.43±830.74
Akiode	90	96	978.43±879.24
Ike-Ajibefun	90	100	3611.36±224.58
Tolato	70	98	1027.36±714.45
Aka/Kipe	70	96	2617.16±454.08

Table 2: Age-sex related intensity (± SEM) of *Ascaris lumbricoides* infection

Age class(years)	Idi-Ori	Dega Eruku	Akiode	Ika-Ajibefun	Tolato	Aka/Kipe
1-10	2860.76±371.1	1421.73±880.17	1292.60±791.64	1824.00±1821.10	2804.00±151.4	826.00±421.10
11-20	2815.94±462.8	2536.95±546.67	415±119.41	4617.37±1149.10	536.95±146.67	216.95±177.6
21-30	4126.00±1484.3	3874.42±923.18	320.25±1187.31	1388.33±1532.10	864.42±323.10	774.42±223.99
31-above	2343.50±612.0	2359.00±945.98	378.00±1370.99	4634.00±1625.10	978.00±308.69	178.50±70.93
Sex						
Male	2795.44±446.4	1846.08±395.72	667.61±560.20	3787.78±807.50	2687.78±43.57	2197.78±227.5
Female	2852.17±475.7	2656.78±450.09	1289.25±880.87	3434.96±1013.40	1967.25±143.8	1755.22±210.7

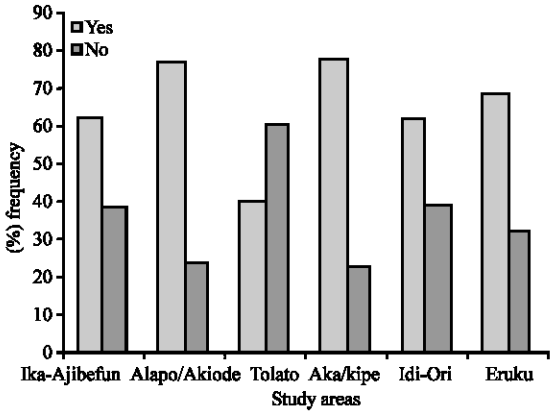

Fig. 1: Responses on the effect the infection due to *A. lumbricoides* had on daily activities

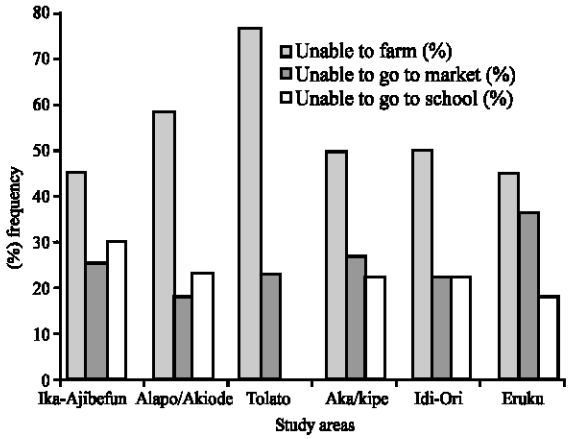

Fig. 2: Responses on the effect of the burden on socio-economic activities

respectively. On the source of drinking water in the different communities, the study observed that majority of the respondents across the communities make use of stream water 65.6%, followed by borehole 28.1 and 6.3% of respondents use the deep well, respectively.

Burden of infection: The symptoms of infection as explained by the respondents across the communities were expulsion of worms in faeces, stooling and vomiting 81.5%, followed by malaria and cough 10.7%. Others are stunted growth and reduction in food intake 4.1%, while body weakness 3.8% had the least symptoms.

The effects of the burden of infection due to *A. lumbricoides* were assessed among the respondents in the different study areas. Figure 1 below clearly indicates that majority of the respondents (over 60%, mean = 64.72±15.28) considered the infection with *A. lumbricoides* a very serious effect on their daily activities, when compared with negative responses mean of 35.28±15.28.

On the activity most affected, Fig. 2 illustrates that 55% of the respondents admitted that infection due to ascariasis affected farming activities, followed by their inability to attend market (25%) and school (20%). T-test analysis revealed a significant difference between burden of infection and their socio-economic activities (i.e. unable to farm (t ' 12.260, p'<0.005), unable to go to school (t ' 4.670, p'<0.005) and unable to go to market (t ' 11.382, p'<0.005) accordingly.

Table 3: Demographic information about the respondents

	%
Sex	
Male	54
Female	46
Age groups	
1-10 years	27.5
11-20 years	12.9
21-30 years	25.1
> 31 years	34.5
Marital status	
Married	44
Widow	9.7
Separated	15.1
Single	30.7
Educational status/level	
No formal education	38.2
Primary school	41.4
Secondary school	20.4

On the duration of infection, most of the respondents in the communities i.e. Aka/Kipe ' 77.8, Eruku ' 77.3, Alapo/Akiode '52.4, Idi-ori '51.2, Tolato ' 50% and Ika-Ajibefun ' 46.2%; are of the opinion that infection due to *A. lumbricoides* exceeded 5 months in their body system. Student T-test analysis on the effect of the duration in the different community members revealed only significant relationship in Aka/Kipe (t '4.330, p<0.002) and Idi-ori (t '3.794, p<0.004) villages.

The levels of assistance offered during the period of infection are presented in Table 4. Statistical mean

Table 4: Effect of infection burden due to Ascariasis on the respondents

	%
Duration of infection	
1-2 days	14.7
3-6 days	10.3
1-2 weeks	2.7
3-4 weeks	3.3
1-2 months	6.3
3-5 months	3.6
> 5 months	59.2
Assistance received	
Self 14.9	
Hired labour	17.2
Children	15.08
Husband	1.3
Husband and children	6.35
Wife and children	8.98
Parents	14.8
Friends	12.8
Relatives	8.7
Attitudinal responses	
Complained	68.5
Endured	24.5
Showed pity	7.0

Table 5: Communal attitudes on treatment measures against gastrointestinal parasites

	%
Treatment method	
Use of orthodox drugs	40
Herbal therapy	29.7
Prayers	8.7
Ignored the disease	21.5
Cost of treatment (N)	
1-50	45.3
51-100	9.6
101-200	6.1
201-300	0.6
> 300	1.8
Do not want to pay	36.6
Effective duration of treatment	
Days	60.4
Weeks	19.2
Months	7.6
Ineffective	12.8

analysis revealed that most sick persons relied more on hired labour (17.23±11.57), followed by children (15.10±10.19), parents (14.76±9.08), friends (12.75±13.35), respectively. T-test analysis on the level of assistance received revealed no significant relationship among them. This implies that the levels of assistance do not depend on the type of individual, but the person that is readily available to offer the assistance. Correlation analysis at 95% level (0.838) revealed a significant relationship between the infected individual and his/her spouse.

In assessing respondents' attitude during the duration of infection, Table 4 shows that most of those who offered assistance had cause to complain about the time they dedicated to the sick person when compared to persons that endured and showed pity, respectively.

The study also showed that 54.68% of the respondents in the different communities visited or utilized the health centre as against 45.32% that did not use the opportunity of visiting the health centres during the period of infection. The communal attitudes Table 5 showed that 40% of the respondents across the communities used orthodox drugs for treatment, followed by 29.7% that utilized herbal treatment. 8.7% of the respondents believed solely on prayers for spiritual treatment and healing, while 21.5% ignored the treatment of the disease condition.

In assessing the financial burden with respect to spending capacity of the infected persons to pay for drugs in the treatment of the disease, 45.3% of the respondents are willing to pay between N1 - N50, when compared with 36.6% of the respondents that are not willing to pay for treatment and preferred to ignore treatment Table 5. The lack of willingness to pay for treatment may also be connected with economic power of the respondents who are mainly subsistence farmers. On the effectiveness of the use of drugs, 60.4% of respondents admitted that treatment with orthodox drugs were effective within 1-5 days. Ignorance had been largely canvassed as a factor contributing to the continued transmission of gastrointestinal parasites. This was evident as 12.8% of respondents stated that there is no treatment for gastrointestinal helminths. This may not only be due to ineffectiveness on mode of treatment or improper usage of the required dosage because of their occupation, but also on the ignorant nature of the rural dwellers on the biology of gastrointestinal parasites.

DISCUSSION AND CONCLUSION

The study observed that in spite of the high prevalence of ascariasis in the communities, intensity was low across all age groups and sexes. Neither age nor sex was found to be an important factor with regard to both prevalence and intensity of infection, indicating a common pattern of behaviour and susceptibility in all the communities. This is however in contrast with studies of Asaolu[15] in some rural communities elsewhere in Southern Nigeria where both prevalence and intensity peaked in the 5-14year old, while it declined in the older age classes.

The percentage of persons above 31 years could be correlated with the areas of study, which is also related to the number of married respondents. This is also due to the need for more helping hands in agriculture, in order to reduce the cost of labour. The literacy level of the respondents were low, in view of the fact that majority of persons had no formal education or attended only primary school (which may be due to the percentage of persons within age groups 1-20 years). The study observed that

some parents considered one or two year's education enough for literacy for their children in primary school and needed them in labour especially in low-income families; as also reported by Ulukanligil[16].

Hygiene and sanitary evaluation of the respondents revealed the high use of bush as site of waste disposal 92.2% and defecation 92.9%. The unhygienic practices of the respondents contribute to the spread of helminth infections responsible for disability and morbidity. Despite the availability of borehole (hand pump) in Idi- ori community, majority of the respondents across the communities (Idi-ori inclusive) still prefer getting their drinking water from the stream. The stream, they claimed, is a gift to the communities from God and the water from this stream heals any kind of diseases. Secondly, they complained that the borehole (hand pump) is stressful and time consuming hence they prefer water from the stream.

The high percentage of infection with *A. lumbricoides* across the communities confirms earlier reports by Mafiana[3]. This is as a result of the fact that ignorance; poor water and unhygienic practices contribute to the spread of the infection pattern of *A. lumbricoides*[2,5]. The study confirms reports by Sam-Wobo[17], where most respondents are ignorant of the fact that *A.lumbricoides* are acquired by the ingestion of viable eggs. Most respondents claimed that the presence of *A.lumbricoides* in their body is not an infection but a natural occurrence in the body.

Smyth[18] had reported that the adult worms in the intestine evoked generalized digestive disorders such as abdominal discomfort, nausea. However, the symptoms of infection mostly identified by infected respondents are pains and vomiting. The burden of the disease due to ascariasis had been reported in developing countries to be responsible for poor growth, reduced physical activity and impaired learning ability[19]. Result from this study reveals that majority of the respondents (over 60%) considered the infection with *A.lumbricoides* a very serious burden (i.e. unable to go to farm (t'12.260, p'<0.005), unable to go to school (t'4.670, p'<0.005) and unable to go to market (t'11.382, p'<0.005)). T-test analysis revealed a significant relationship between burden of the infection and socio-economic activities.

Result obtained from the level of assistance received during period of infection showed that there was no significant relationship, which implied that assistance depends on the willingness and readiness of the individual to offer assistance. However, there was a correlation between the infected respondent and his/her spouse since couples do the farm work together to sustain the family. Schopper[20] reported that communicable diseases accounted for 79% of the disability adjusted life years. The study also observed that those infected and those that offered assistance complained about waste of time, leading to loss of productive years.

Andrade[21] reported that broad spectrum anti-helminthic drug is an effective means of reducing worm burden and its related morbidity. Some of the respondents stated that drugs like Levamisole given to them during infection had been effective in the treatment of the *A. lumbricoides* infection and the beliefs that there was no drug for treatment of *A. lumbricoides* by some respondents might be due to incomplete usage of drugs, as well as lack of willingness to pay for treatment, which also brings to fore the serious problem of ignorance, attitude and beliefs by rural communities.

Finally, the study had showed that ascariasis infection is a serious burden on the health status of both the infected persons and those offering assistance among rural communities of Abeokuta of Ogun State. Adequate health education should be promoted so as to reduce the disease burden, encourage good sanitary environment and mass chemotherapy coupled with other basic amenities to provide some level of good living in the rural communities.

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