

*Full Length Research paper*

# Epidemiology of human onchocerciasis among farmers in Ebonyi State, Nigeria

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An epidemiological study on human onchocerciasis was conducted among 450 randomly selected farmers comprising of 213 males and 187 females within the age range of 20 - 50 years and above resident in Ebonyi central senatorial zone of Ebonyi State, Nigeria from January 2009 through December. Onchocerciasis infection was diagnosed by parasitological observation for the presence of microfilariae of *Onchocerca volvulus* in skin biopsies and adult filariae in excised nodules. Physical examination on the skin of each subject was carried out for Onchocercal depigmentation (Leopard skin) and visible nodules while ocular examination was carried out with illiterate E chat, ophthalmoscope and tonometer. One hundred and fifty (33.3%) farmers were infected with *O. volvulus* comprising 100(38.0%) males and 50(26.7%) females. The highest infection rate of 37(55.3%) was observed in subjects aged of 50 years and above while the least infection was within the age range of 20 - 29 of age 17(15.5%). 19(19%) of infected males and 3(6%) females had skin lesions due to onchocerciasis, partial blindness was observed in 6(6%) males and 3(9%) females, 64(64%) males and 20(40%) females had low vision while complete blindness was observed in 4(4%) males and 2(4%) females. The importance of implementing onchocerciasis control programmes such as African programme for onchocerciasis control (APOC) and onchocerciasis control programme in West Africa (OCP) in the study areas is hereby advocated.

**Key words:** Onchocerciasis, microfilaria, leopard skin, nodules, Ebonyi State, Nigeria.

## INTRODUCTION

Onchocerciasis is increasingly recognized as one of the major diseases of public health importance in endemic parts of the world, especially in Sub-Saharan, Africa. West Africa includes the most endemic areas in the world, Nigeria being one of the largest countries of West Africa has been reported to have a high incidence of onchocerciasis infection with 7 million people with the disease and 40 million at risk (Anosike et al., 1983). Onchocerciasis is a chronic parasitic infection caused by the filarial nematode, *Onchocerca volvulus*. The disease is transmitted from one individual to another through the

bites of the black fly *Simulium damnosum* of the family Simuliidae (Nwoke et al., 1991). Onchocerciasis is basically a rural disease affecting communities sited along fast-flowing rivers with symptoms particularly irritating and disabling, often associated with long-term exposure to infection and this affects the social and economic activities of the inhabitants concerned (Edungbola and Asaolu, 1984). Onchocerciasis is also a major cause of 60% of blindness in different parts of Africa where it affects the socio-economic development of people (Abiose, 1993; WHO, 1995). This survey was carried out to investigate the epidemiology of onchocerciasis disease and the frequency of different manifestation associated with the infection in Ebonyi Central senatorial zone of Ebonyi State, Nigeria.

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**Table 1.** Percentage of onchocerciasis in relation to gender.

	Males	Females	Total
Numbers examined	263	187	450
Numbers infected	100	50	150
% of infection	38.0	26.7	37.3

**Table 2.** Prevalence of onchocerciasis in different Local government area.

L. G. A.	Sex	Number examined	Numbers infected	%sex infected	Total % of infection
Ezza South	Male	64	16	25	23.6
	Female	46	10	21.7	
Ezza North	Male	52	20	39.2	34.4
	Female	39	11	28.2	
Ikwo	Male	77	35	45.4	39.3
	Female	50	15	30	
Ishielu	Male	71	29	40.8	34.9
	Female	52	14	26.9	

## MATERIALS AND METHODS

### Study area

The study area is the food producing area of Ebonyi central senatorial zone of Ebonyi State which includes; Ezza South, Ezza North, Ikwo and Ishielu Local Government Area. These areas lie in a typical rainforest zone surrounded by the Ebonyi River Esu which flows fast into the Cross-River in Calabar. This Senatorial zone has a population of about 37,000 people mostly farmers. From January 2009 through December, four hundred and fifty farmers were randomly selected and tested for skin and ocular onchocerciasis after obtaining permission from the village and house hold head.

### Assessment of skin snips for the presence of *Onchocerca volvulus*

Skin snips were aseptically taken from each subject from right iliac crest and the two gluteal folds (buttocks), using a Holth type corneal punch with a 1.5 mm bite. The punch was treated with glutaraldehyde and sodium hypochloride solution and rinsed with distilled water and alcohol. The skin snips were then placed in microtitre wells containing 0.3 ml of phosphate buffer saline (PBS), and covered with cellophane to prevent evaporation and spillage during handling. Some of the liquid contents were placed on a microscope slide using a Pasteur pipette and examined under microscope at x10 magnification for the presence of *O. volvulus* microfilariae within 1 h of sample collection. The microtitre plates containing skin snips were further incubated on a water bath at 37°C for 24 h and re-examine for microfilariae when samples were negative. The results were compared using student t-test of significance. When samples were positive microfilariae are seen wriggling in the saline.

### Assessment of skin for signs of onchocerciasis

A typical examination of each subject was carried out for obvious signs of onchocerciasis such as onchocercal depigmentation (Leopard skin), palpable or visible nodules, hanging groins, elephantiasis, pruritus as well as dermal fibrosis and atrophy.

### Ophthalmological examination for ocular onchocerciasis

The visual acuity at far and near distance was tested using illiterate E chart and ability to count fingers at distance up to 6 m. Ocular media and ocular pressure were examined using ophthalmoscope and schiotz tonometer respectively.

## RESULTS

Out of 450 subjects examined comprising 263 males and 187 females 150(33.3%) were infected, 100(38.0%) were males while 50(26.7%) were females (Table 1). There is no significant difference in the rate of infection between male and female subjects examined ( $P > 0.05$ ). Prevalence of onchocerciasis infection was highest in Ikwo local government area (39.3%) followed by Ishielu (34.9%), Ezza North (34.4%) and Ezza South (23.4%) (Table 2). Subjects within the age of 50 years and above were the most infected (55.2%), while subjects within the age range of 20 - 29 years were the least infected (15.4%). 25.8 and 50.4% was infection rate within the age range of 30 - 39 and 40 - 49 years, respectively (Table 3). Onchocerciasis manifestations in subjects

**Table 3.** Age related infection rate in different Local Government Area.

L. G. A.		Age Groups (years)			
		20 - 29	30 - 39	40 - 49	50 and above
Ezza South	Numbers examined	25	41	26	18
	Numbers infected	2(8%)	6(14.6%)	8(30.9%)	10(55.5%)
Ezza North	Numbers examined	20	30	25	15
	Numbers infected	1(5%)	8(26.6%)	13(52%)	9(60%)
Ikwo	Numbers examined	35	50	22	20
	Numbers infected	3(8.5%)	20(40%)	17(77.2%)	10(50%)
Ishielu	Numbers examined	30	49	30	14
	Numbers infected	11(36.6%)	10(20.4%)	14(46.6%)	8(57.1%)
% infected		15.4%	25.8%	50.4%	55.2%

**Table 4.** Onchocerciasis manifestation in different Local Government Area.

L. G. A.	Numbers examined	Numbers infected	Nodules	blindness	Leopard skin	Puritus and other dermatitis	Hanging groin and elephantiasis
Ezza South	110	26	-	1	1	3	1
Ezza North	90	31	1	2	2	5	-
Ikwo	127	50	2	1	1	2	1
Ishielu	123	43	-	2	-	3	-
% of manifestation		33.3	0.7	1.3	0.9%	2.9%	0.4%

showed that pruritus and other dermatitis had the highest rate of manifestation of 2.9% followed by blindness 1.3%, leopard skin 0.9%, nodules 0.7%, hanging grown and elephantiasis 0.4%. Also onchocerciasis manifestation was more prominent in subjects from Ezza North, followed by Ikwo, Ezza South and Ishielu (Table 4). All clinical signs and symptoms of onchocerciasis that were recorded were found to be present in males while in female only pruritus and other dermatitis, total and partial blindness with low vision were present, low vision had the highest prevalence in male and female subjects while the lowest prevalence was blindness in females and hanging groin and elephantiasis in male subjects (Table 5).

Onchocercal lesion and symptom distribution in subject of different age groups showed that (1.8%) of pruritus and other dermatitis were found to be present in subjects within the age range of 20 - 29 namely, (1.8%) of pruritus and other dermatitis including nodules were found to be present in subjects within the age range of 30 - 39, 7.8% of nodules, blindness, leopard skin, pruritus and other dermatitis were present in subjects within the age range of 40 - 49 and within 50 years and above

17.9% of blindness, leopard skin, pruritus and other dermatitis, hanging grown and elephantiasis were present. The study results in general showed some differences in rates of onchocerciasis infections/lesions/symptoms with respect to age, sex and in local government areas that makes up Ebonyi Central Senatorial zone ( $P < 0$ ).

## DISCUSSION

The prevalence of onchocerciasis has been established in different parts of Nigeria by various researchers (Wyatt, 1971; Ogunba, 1982; Akinboye et al., 2010; Rebecca et al., 2008; Wogu and Okaka, 2008; Okoye and Onwuliri, 2007). Its rate of occurrence as reported by these researchers varies from one geographical area to another with highest endemicity of 83% recorded in Ovia North East L.G.A of Edo state (Akinbo and Okaka, 2005) and 54.2% in Ibarapa L.G.A. of Oyo (Akinboye et al., 2008). The prevalence of onchocerciasis in Ebonyi Central Senatorial zone is relatively high with 33.35%

**Table 5.** Onchocerciasis manifestation by gender.

Sex	Numbers examined	Numbers infected	Nodules	Blindness	Pruritus and other dermatitis	Hanging groin and elephantiasis	Leopard skin	Partail blindness	Low vision
Male	263	100	3	4	10	2	4	6	64
Female	187	50	-	2	3	-	-	3	20
Total	450	150	3	6	13	2	4	9	84
%		33.3	0.7	1.3	2.9	0.4	0.9	2.0	18.7

infection rate among subjects examined. Onchocerciasis prevalence was more prevalent in males 38.0% than female 26.7% subjects, although the difference is not statistically significance ( $P > 0.05$ ). In the findings of the present study, Onchocerciasis prevalence is higher than the 26.9% recorded by Nwaorgu et al. (1994) in onchocerciasis mesodermic area of Enugu State, Nigeria. The study finding also support the works of other researchers in different parts of Nigeria as referenced above in onchocercia gender infection but differs with the work reported in Ovia North East L.G.A of Edo State, Nigeria with 93% onchocerciasis prevalence in female and 74.5% in male (Akinbo and Okaka, 2005). Wogu and Okaka (2008) reported onchocerciasis infection in Okpuje Owan L.G.A of Edo State with 27.5% infection in male and 20% in female. Onchocerciasis prevalence is more in Ikwo L.G.A 39.3% than in the other L.G.As, 34.9% in Ishielu, 34.4% in Ezza North and 23.4% in Ezza South (Table 2). Ikwo L.G.A. is surrounded with river and is also very close to Cross River where the main Ebonyi River Esu flows into. People in this area are known to be rice farmers so the high prevalence of infection is not out of place as they always work in swamps with their body exposed, making it possible for black

flies bite. The differences in infection rate according to gender may be due to endemicity (Nwoke et al., 1991), occupational exposure (Onwuliri et al., 1987) and susceptibility of individual. In Ebonyi state, most people are farmers especially men who normally stay outside the house mostly in the farm and hence have a greater exposure to bites by vector black flies. Although males and females engage in farming, men exposure are more than women, as a larger part of their body is uncovered and thus vulnerable to *Simulium demnosum* bites.

The age group with highest infection was those at 50 years and above (Table 3). 55.2% of subject at the age of 50 years and above were infected with onchocerciasis followed by 40 - 49 years (50.4%), 30 - 39 years (25.8%) and 20 - 29 years (15.4%). The main working population in the study is from 30 years and above and the result of the study showed progressive increase in infection with increase in age, also the rate of onchocercia disease manifestation follows the same trend. A similar observation was made in Ibarapa L.G.A. of Oyo state Nigeria (Akinboye et al., 2010) and in Garaha-Dutse community, Adamawa State (Rebecca et al., 2008). Onchocerciasis clinical manifestations were more in subjects examined in Ikwo L.G.A., followed by Ezza North, Ezza South

and Ishielu. As stated above Ikwo is the main farming area in this zone and were mostly rice farmers who go out to the farm very early in the morning and stayed till very late in the evening especially during the time of chasing birds apart from eating their rice. As they are more exposed to the swamp farming environment, they are more prone to infection by the bites of black vector. Onchocercal lesions were more prevalent in male subjects than females.

Conclusively, the study demonstrated a relatively high prevalence of *O. volvulus* infection in Ebonyi Central Senatorial zone of Ebonyi State, Nigeria. The prevalence rate is higher in males than females within the age range of 30 years upwards; different rate of infection was observed in different L.G.As in Ebonyi Central Senatorial zone with variations in onchocercal lesions. This is similar to the findings of other researchers (Gemade et al., 1983; Okonkwo et al., 1991). Farming is the major occupation of the community under study. In the members of the community, comprising males and females who were infected, there are obvious relationships in the rate of infection with age, gender and location. The prevalence could be attributed to the banks of river in Ebonyi Central Senatorial zone, since the rivers are close to the village settlement. The

**Table 6.** Age distribution on onchocercal lesions.

	Age groups				Total
	20 - 29	30 - 39	40 - 49	50 yrs and above	
Numbers examined	110	170	103	67	450
Numbers infected	17	44	52	37	150
Nodules	-	1	2	-	3
Blindness	-	-	1	2	3
Leopard skin	-	-	2	2	4
Hanging groin and elephantiasis	-	-	-	2	2
Pruritus and other dermatitis	2	2	3	6	13
Total % of lesions	2(1.8)	3(1.7)	8(7.8)	12 (17.9)	25(5.6)

advanced stage of onchocerciasis with Leopard skin, palpable nodules, scaly skin (Lizard skin), and blindness which are indicators of long standing infection with *Onchocerca volvulus* were more present among subjects from 30 – 50 years and above showing long time exposure to bites of the vectors as they are old in their farming profession. The study clearly underpins the need for immediate implementation of African programme for onchocerciasis control or onchocerciasis control programme in West Africa in Ebonyi Central Senatorial zone to prevent continuous spread and disease morbidity related to this infection.

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