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Prevalence of guinea worm disease in Akoko north-east local government area of Ondo state, Nigeria

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ABSTRACT

Study on the prevalence of dracunculiasis was carried out from 1999 to 2004 in Auga-Okemale, Iboropa and Ise-Akoko, in Akoko North-East Local Government of Ondo State, Nigeria. The annual prevalence of dracunculiasis was found to be significantly (P≤0.05) different in the towns. Out of the 2922 persons examined for dracunculiasis, 202 (6.9%) persons were infected. Dracunculiasis was more prevalent in Auga Okemale (8.1%) than in Iboropa (7.2%) and Ise-Akoko (3.5%). During the survey, prevalence was found to decrease annually. In year 2002 to 2004, no transmission was observed in Ise-Akoko while there was transmission from 1999 to 2004 in Auga-Okemale and Iboropa. Prevalence in Auga-Okemale was 23.2% in 1999, 12.0% in 2000, 9.8% in 2001, 0.5% in 2002 and 2003 respectively and 0.4% in 2004. Next is Iboropa, with 22.4% (1999), 10.5% (2000), 8.6% (2001), and then 1.5% (2003 and 2004). Prevalence was significantly (P≤0.05) high (7.6%) in males than in females (6.2%). Age and sex prevalence of dracunculiasis show that in both sexes, infection rate increased from age group 6-10 years old to 31-35 years. There was no transmission (0.0%) prevalence among males and females of age 0-5 years. Prevalence in males ranged from 4.4% to 5.9% respectively in those aged 6-10 years and 16-20 years old while in females of the same age groups, it ranged from 0.0% to 6.6%. Infection rate in males of 41-45 years was 10.8%. In females of 26-30 years and 31-35 years, infection rate of 9.4% and 9.7% were respectively observed.

Keywords: Dracunculiasis, Prevalence, Akoko North-East, Nigeria.

INTRODUCTION

Dracunculus medinensis (guinea worm) is a parasitic nematode worm. It causes the disease condition known as dracunculiasis or dracontiasis in man. The disease is commonly referred to as Guinea worm disease (GWD). Guinea worm and the disease caused by it (dracunculiasis) as well as its association with humans, have a very rich history. Provided human beings are not re-exposed to infection the parasite does not persist for more than a year [9]. Dracunculiasis is the most common parasitic infection in Akoko area of Ondo State. The disease has ravaged the area for over two decades and has inflicted untold hardships to the people. The impact of such hardships on agricultural productivity, educational standard and indeed on the economy of the people cannot be quantified [, 3].

The genus cyclops (*Crustacea Copepoda*) also known as water fleas serve as intermediate hosts of *Dracunculus medinensis*. There are many species of cyclops known to inhabit stagnant ponds, wells and other unprotected water sources [8, 12]. In man, the mature female worm normally resides in the subcutaneous tissues. While residing in this region of the body, the worm which would have become gravid will produce a painful papule in the dermis which either form a blister within 24 hours or may enlarge for several days before becoming a blister and finally burst to

produce a small shallow ulcer [15, 19]. Human beings infected with this parasite often look for water to alleviate the symptoms of the allergic reaction and to wash the ulcer. When in contact with water, the uterus of the female worm project out from the ulcer cavity, after which milky white secretions containing hundreds of active juvenile worms pass into the water. The exposed end of the uterus dries up and shrivels to block the release of further juvenile worms. The process is repeated if the lesion is re-submerged in water until the entire brood of larvae is discharged from the female worm [11]. Once in the aquatic environment, appropriate species of copepod will ingest the mobile larvae. These larvae undergo and complete the usual embryonic development (two moults) to the infective stage in the body cavity (haemocoel) of the cyclops within two weeks [21].

The final stage in the transmission of guinea worm infection involves man who is the definitive host. Man become infected when he consume water containing cyclops that is infected with the larvae of *Dracunculus medinensis*. The hydrochloric acid present in the gastric juice in the stomach of man kill the cyclops, the larvae survived, become activated and then escape from the dead cyclops. The larvae during migration, penetrate through the intestinal wall and finally to the subcutaneous connective tissues [18].

Clinical manifestations and pathological features of dracunculiasis can become apparent in an infected person in three ways. These are by the recognition of palpable swellings and sometimes moving worms, allergic symptoms and the formation of a blister or bleb. These clinical manifestations are generally localized. The formation of papules and sometimes moving worm in papules are the first evident sign of guinea worm disease which appear when the gravid female is about to emerge from the subcutaneous tissues [14]. This provokes the formation of blisters within a minute. The blister is usually the first sign in 60% of guinea worm cases when first noticed but may increase in diameter before it finally bursts and it usually happens in 1-3 days. These allergic symptoms normally appear a day preceding the formation of blisters but vanish in a few hours. These allergic reactions come in the form of urticaria, fever, giddiness, dysponea and infra-orbital oedema. Itching and intense burning pain accompany the blister formation and these sensations subside soon after the guinea worm patient immersed the busted blister into cold water then the larvae are discharged. The larvae are discharged when the anterior part of the worm extrudes through the ulcer formed by the bursting of the blister. Dracunculiasis is not a lethal disease [18, 15]. The complete expulsion of the worm from the affected body parts is within 2-4 weeks and the sore heals up rapidly thereafter. In 57% of all the observed cases in Nigeria, expulsion process of guinea worm is mild and comes with minimum or no discomfort [13].

MATERIALS AND METHODS

The Study Area

This study was carried out in three different towns (Auga, Iboropa and Ise-Akoko) in the Northeast Local Government Area of Akoko, Ondo State between 1999 and 2004. Information on population structure was obtained from the National Population Commission Office, Akure, Ondo State while information on the land area was provided by the State Ministry of Lands and Housing Akure, Ondo State (Table 1). Auga with a population of 19,435 persons lies within the latitude $7^0 33^1$N and longitude $5^0 54^1$E, Iboropa with a population of 21,768 people is within the latitude $7^0 32^1$N and longitude $5^0 51^1$E while Ise-Akoko with a population of 12,923 people is within the latitude $7^0 31^1$N and longitude $5^0 55^1$E. House settlement patterns in each town are the linear types with few scattered types which are approximately 250-300 households; some are made up of about 8-10 individuals per house. The inhabitants are mostly Yoruba speaking people mixed with few other tribes but the main dialect is Akoko.

Survey Method

Prior to the survey, contact was established with officers in the Ondo State Ministry of Health, in Endemic and Parasitic Disease Unit, Health Management Board of Akoko Northeast Local Government Area, the State Water Sanitation (WATSAN), the facilitators and village appointed trainees of the Nigerian Guinea Worm Eradication Programme. Through these means, information was obtained on the status of infection in each area, intervention types used, available water sources socio-economic activities of the people, campaign strategies directed at the containment of guinea worm infection, the education of the masses with respect to their knowledge and awareness of the infection and it's mode of transmission. Using standardized questionnaire, information relating to the infection rate with age, sex, occupation, marital status, state of origin, ethnic groups were obtained from each person.

Evidence of infection was based on cases of active transmission. Infection was diagnosed by examining each person for the presence of papules, blisters, oedema, purulent discharges, chronic ulcer, pre-emergent worm, emergent worm, abscesses and other diagnostic features associated with dracunculiasis. Predilection sites of emergent worms in infected persons were observed and recorded in order to know the most predilection site.

RESULTS

The overall prevalence of dracunculiasis in Auga-Okemale, Iboropa and Ise-Akoko between 1999 and 2004 is as shown in Table 1. Among the 2,922 persons examined for guinea worm disease, 202 (6.9%) persons were infected. Guinea worm disease was found to be more prevalent in Auga-Okemale (8.1%) than in Iboropa (7.2%) followed by Ise-Akoko (3.5%).

The annual prevalence of dracunculiasis was found to be significantly ($P \leq 0.05$) different in the towns. Dracunculiasis prevalence was highest in 1999 followed by 2000, 2001, 2002, 2003 and was least in 2004 (Figure 1). As shown in Figure 1, there was no guinea worm infection in Ise Akoko from 2002 to 2004 while there was transmission from 1999 to 2004 in Auga-Okemale and Iboropa. In Auga-Okemale, the prevalence rates in 1999, 2000, 2001, 2002, 2003 and 2004 were 23.2%, 12.0%, 9.8%, 0.5%, 0.5% and 0.4% respectively. Next is Iboropa, with 22.4% (1999), 10.5% (2000), 8.6% (2001), and then 1.5% (2003 and 2004). In Ise-Akoko the disease was less prevalent, infection ranged between 8.2% (1999) and 0.0% (2004).

Table 1: Overall Prevalence of Dracunculiasis by Town in Akoko North-East Local Government Area

Town	Number Examined	Number Infected	Infection Rate (%)
Auga-Okemale	1177	95	8.1
Iboropa	1257	90	7.2
Ise akoko	488	17	3.5
Total	2922	202	6.9

The age and sex related prevalence of dracunculiasis presented in Table 2 shows that there was no guinea worm infection (0.0% prevalence) among males and females of 0-5 years old. In both sexes, infection rate increased from age group 6-10 years old to age group 31-35 years old but it dropped slightly among those aged 36-40 years old. In males, the infection rate ranged from 4.4 to 5.9% in age groups 6-10 years and 16-20 years old while in females of the same age groups, it ranged from 0.0 to 6.6%. The highest infection rate among the males was 10.8% and this was among those aged 41-45 years old while infection rate ranged from 9.4% to 9.7% among females of age category 26-30 years old and 31-35 years old. In this local government, dracunculiasis was high (7.6%) in males than in females (6.2%) but the prevalence among the different age groups and sexes was significantly ($P \leq 0.05$) different.

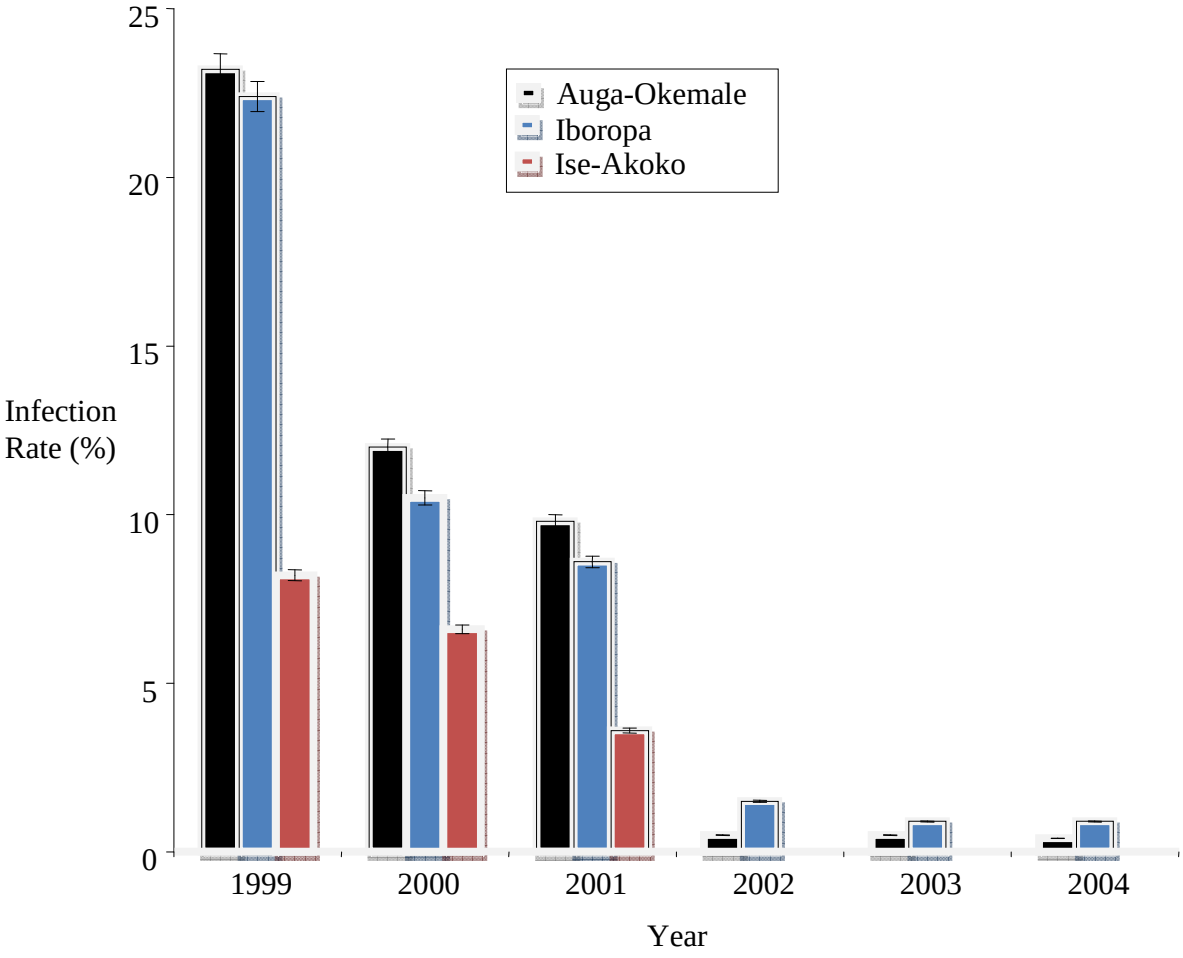

Figure 1: Pattern of guinea worm infection in Akoko North-East Local Government Area

DISCUSSION

The result from this work revealed two salient observations about the prevalence of dracunculiasis in Akoko Area of Ondo State. Firstly, there was a high prevalence dracunculiasis from 1999-2001. As a result of the control exercise in the area, the Nigeria Guinea Worm Eradication Programme [16] had reported only 31 guinea worm cases in the study area and in the whole of Ondo State. The implication here is that prior to this study in 1999, the area must have attained a non-endemic status. Similar observation was reported in Akoko South-West [4] and Akoko North-West [16, 4, 5]. The high prevalence that occurred in 1999-2001 shows that there was a resurgence of dracunculiasis in the area. Resurgence in this study could probably be due to the non-functional status of most of the wells and boreholes in all the areas. During the dry seasons, some of the water sources dried up because of their shallowness and again increasing population between 1996 to1999 could probably be another reason for insufficient availability of water to sustain the people. The quest and rush for water by the increasing population could have been responsible for the damaged hand pumps, useful components of wells and boreholes in the area. People therefore would have no other alternative than to lean back on their abandon pool of water sources. Poorly constructed water

sources are known to be responsible for causing people to lean back on their abandoned pools of water thereby increasing the risk and prevalence status of guinea worm infection in a population [13, 6 and 7].

Table 2: Age and sex distribution of guinea worm disease in Akoko North East Local Government

AGE GROUPS	MALES			FEMALES			TOTAL		
Years	Number Examined	Number Infected	Infection Rate (%)	Number Examined	Number Infected	Infection Rate (%)	Number Examined	Number Infected	Infection Rate (%)
0-5	108.0	0.0	0.0	101.0	0.0	0.0	209	0.0	0.0
6-10	115.0	5.0	4.4	118.0	0.0	0.0	233	5.0	2.1
11-15	167.0	9.0	5.4	133.0	4.0	3.0	300	13.0	4.3
16-20	119.0	7.0	5.9	183.0	12.0	6.6	302	19.0	6.3
21-25	137.0	11.0	8.0	115.0	8.0	7.0	252	19.0	7.5
26-30	155.0	16.0	10.3	107.0	10.0	9.4	262	26.0	9.9
31-35	126.0	13.0	10.3	155.0	15.0	9.7	281	28.0	10.0
36-40	135.0	11.0	8.7	167.0	13.0	7.8	302	24.0	7.9
41-45	223.0	24.0	10.8	207.0	16.0	7.7	430	40.0	9.3
>46	200.0	17.0	8.5	151.0	11.0	7.3	351	28.0	8.0
TOTAL	1485.0	113.0	7.6	1437.0	89.0	6.2	2922.0	202.0	6.90

Secondly, there was a steady decrease in prevalence from 2002-2004. The observation could be due probably to the urgent intervention of the State Government in collaboration with donor agencies such as Global 2000 and Carter Foundation. These concerted and aggressive efforts, brought into the community safe potable water through the proper construction of more wells and boreholes deep enough to last through the dry seasons and to sustain the increasing population. The low prevalence could also be due to increased sensitization of the indigenes in the area to the perception and aetiology of dracunculiasis. This observation is in line with those of Adewole and Hassan [1, 2] and Adewole [2] in the same Akoko area.

Variation in infection rates that was observed among the different age and sex groups which was not significant agrees with the observations of Suleiman and Abdullahi [22], Udonsi [20] and [17]. This could be attributed to equal exposure of both males and females to water containing cyclops infected with guinea worm larvae. There was no active transmission among the 0-5 years age group of both sexes which was probably due to the long period of breast-feeding and the regular consumption of concoctions and decoctions of plant materials boiled in water. This observation is similar with to that of Edungbola [6] who opined that the long period of breast-feeding, usually 18 months, with relatively small volumes of contaminated water swallowed and also the local herbs prepared with boiled water which children ingest is important in killing most of the guinea worm larvae in the cyclops.

CONCLUSION

This study indicated that the lack of safe portable water and inadequate monitoring of control strategies could have caused the resurgence of dracunculiasis in the study area and the only reliable control strategy for the disease is the provision of safe portable water. The supply of rural water projects for the provision of safe portable water in guinea worm endemic areas is a benefit derived from various international agencies (Hopkins and RUIZ-Tiben, 1991). It is therefore recommended, that the Federal and State Governments should make adequate budgetary allocations available for the provision of safe portable water and specialized professional persons should closely monitor such budgetary allocations. This will probably prevent and eliminate water borne diseases such as dracunculiasis. Also it will alleviate the burden of people in rural areas who are constantly threatened by the vicious trinity of poverty, ignorance and diseases. Dracunculiasis is a major preventable cause of agricultural loss among farmers as well as academic backwardness resulting from school absenteeism among students. Dracunculiasis is also the cause of various socio-economic problems. Proper education on the mode of transmission of dracunculiasis in order to sensitize members of the community must be carried out and monitored constantly. These and regular maintenance of all the existing structures laid down for controlling the disease in the area, will be enough to eliminate the disease scourge and thus alleviate the problems of people in guinea worm endemic areas.

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