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Review of cases of children with gonorrhoea—source of infection

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Summary

This is a retrospective study to determine what effort was put into identifying the source of infection in children with gonorrhoea in Ibadan. The case files of eighty-four children aged 1 to 10 years who had gonococcal genital infections between 1983 and 1998 and presented at the Special Treatment Clinic of the University College Hospital, Ibadan were studied. Clinical manifestations of the 84 children include vaginal discharge (97.6%), urethritis (2.4%) and combined genital and eye infection (8.3%). A total of 103 relatives of 61 index subjects were examined. Of those in whom specimens were collected for microscopy culture and sensitivity, 27 (26.2%) had gonorrhoea. A history of sexual contact in the children studied was recorded in only (10.7%) cases, while four (4.7%) others without history of sexual intercourse had torn hymen. Sexual abuse or child neglect was suspected in this group. None of the named contacts was traceable by the health visitors. The recognition of a child with gonococcal infection identifies a cluster of family members who are at increased risk of having gonorrhoea. This study indicates that more effort will be required to find the source and mode of transmission of gonorrhoea in children.

Keywords: Children, gonorrhoea, source.

Résumé

L'étude est en retrospective pour déterminer l'effort fait pour identifier la source d'infection dans les enfants infectés par la blennorragie en Ibadan. Les dossiers de quatre-vingt-quatre enfants âgés de 1 à 10 ans avec l'infection génitale causée par la blennorragie entre les années 1983 et 1998 et qui s'étaient présentés à la clinique de traitement spécial du collège hospitalier universitaire d'Ibadan ont été étudiés. Les symptômes clinique de 84 enfants incluent la perte blanche (97,6%) urethritis (2,4%) et l'infection combinée d'oeil et de genital (8,35). Un total de 103 parents des 61 sujets index ont été examinés. Parmi ceux dont les prélèvements ont été prise pour la culture et la sensibilité microscopique, 27(26,2%) avaient la blennorragie. Une histoire de contact sexuel dans les enfants sous l'observation, était noté surtout dans (10,7%) cas tandis que quatre (4,7%) autres sans histoire sexuelle avaient des hymens déchirés. L'abus sexuel ou le fait de laisser un enfant était soupçonné dans ce groupe. Les officiers de la santé ne pourraient retrouver les contacts nommés. L'identification d'un enfant avec une infection de blennorragie avait indiqué un rassemblement de familles qui était en risque augmenté de s'infecter par la blennorragie. Cette étude indique que plus d'effort sera requis pour trouver la source et le moyen de la transmission de la blennorragie chez les enfants.

Introduction

Gonorrhoea is an infection of worldwide distribution. It is reported in both developed and developing countries. In the United States, the incidence of gonorrhoea rose to an epidemic level in the 70s [1]. In some parts of Africa, where there are no venereal

real disease clinics, gonorrhoea is considered to be endemic, while in the 70s a high incidence of gonococcal infection was reported in adult Nigerians [2].

Although vulvovaginitis due to a variety of causes such as foreign-body, non-specific vulvovaginitis, is not uncommon [3], the most serious form of infection is gonococcal, which in the past was regarded as rare [4]. Other organisms, such as *Staphylococcus* spp. *Escherichia coli*, *Proteus*, *Streptococcus*, *dyphtheroids*, *trichomonads* and *threadworm* have been reported as being commoner causes of vulvovaginitis [3,5,6]. However, Osoba and Alausa in 1974 and in 1980 established that gonococcal vulvovaginitis was common enough to warrant being considered as a public health hazard in Nigeria and other parts of developing tropical Africa [6,7]. Also in 1998, Emele and Anyiwo found 56% of children, with symptoms suggestive of sexually transmissible diseases, had gonorrhoea [8].

Vaginal infections in children usually have been regarded as nonsexually transmitted or have been categorized as nonspecific vaginitis, with inadequate attention given to the mode of transmission. Gonorrhoea, being a sexually transmitted infection, has been explained away, in children, by the theory of fomite transmission, which often did not allow many physicians to probe deeply enough into the possibility of sexual transmission in children. In this era of HIV infections and AIDS, children with gonococcal genital infection are not spared the risk of contracting AIDS and therefore may constitute a public health problem.

Therefore this study is aimed at finding how much effort was committed, in the past, into finding the source and mode of transmission of this infection in children so as to offer suggestions for future use.

Materials and method

This is a retrospective study. The case files of all children attending the Special Treatment Clinic (STC), University College Hospital (UCH) Ibadan, between 1987 and 1998 were studied. Children with complaints of vaginal discharge, symptoms and signs of urethritis, eye discharge and laboratory evidence of *Neisseria gonorrhoeae* infection (Gram-negative, intracellular diplococci on Gram stain of smear and/or positive culture) were selected.

The following parameters were noted: sex and age of patient, symptoms and their duration, site of infection (genital or eye), sexual exposure/assault, the state of the hymen: whether intact or torn, and the results of the laboratory investigations. In addition, the record of contact tracing and the result of laboratory investigation of the contact(s) were made.

The marital status of the parents of the index patients was also noted.

A record of the treatment given to the patients was also studied.

Results

A total of 84 children comprising 82 cases of vulvovaginitis and 2 cases of urethritis, with 7 cases presenting with both genital and eye infections were found eligible for this study. These

consisted of seventy-eight index patients and six contacts; all index patients were aged 1 to 10 years. Most of the patients were referred from the General Outpatient Department and Eye Clinic of UCH and a minority from clinics and hospitals within and outside Ibadan. Table 1 summarizes the age and sex distribution of the children. Majority of them 56 (68.3%), fell within age 3 to 8 years, with the highest occurrence in age bracket 3–4 years (26.2%).

Table 1: Age and sex distribution of 84 children with vulvovaginitis and urethritis

Age (Yrs)	Female N=82%	Male N=2 (%)	Total N=84 (%)
1 - 2	12(14.6)	0	12 (14.29)
3 - 4	22(26.8)	0	22 (26.19)
5 - 6	18(21.8)	0	18 (21.42)
7 - 8	16(19.5)	0	16 (19.05)
9 - 10	14(17.1)	2	16 (19.05)
Total	82(97.6)	2(2.4)	84 (100)

Symptoms and signs:

All the cases of gonococcal vulvovaginitis presented with a history of vaginal discharge, which was described as yellowish, creamy, brownish or purulent and occasionally copious and foul smelling. Other symptoms complained of are vulval-itching, peppery feelings and dysuria. The duration of symptoms before presentation varied widely. Majority 35.7% (30 of 84) gave history of 1–5 days duration while 4.8% (4 of 84) gave a history of 1–3 years. Others gave a history of 1–6 weeks. The site of infection was mainly the genital tract; 82 (97.6%) had vulvovaginitis, 2 (2.4%) had urethritis; but 7 cases (8.3%) had both the genital tract and eye infections.

Types of sexual experience of index patients

Of these children, only 9 girls (10.7%) had history of sexual exposure (Table 2). All except 1 aged 2 years were within age

Table 2: Types of sexual experience

Age (yrs)	History of sexual	Sexual Assault	Sexual Exploration	Total
1 - 2	11	1*	0	12
3 - 4	22	0	0	22
5 - 6	18	0	0	18
7 - 8	12	1**	3	16
9 - 10	12	1***	3	16
	75 (89.3%)	3 (3.57%)	6 (7.13%)	84

The girl's 16-year old cousin

**A boy of 18 years (co-tenants son)? Raped her

***Forced to have sex with an 18 year old boy

range 7–10 years. Two of these girls gave history of being forced to have sex with older boys aged 18 years in each case. An 8-year-old girl confessed to being fingered by another school-girl, while two other girls voluntarily had sexual intercourse with older boys. The state of the hymen was recorded in only 6 of the 75 girls who gave no history of sexual exposure, and 4 were noted as not intact. The first, of these four, was an 8-year-old girl who had been having vaginal discharge for about 3 years. The second was a 6-year-old girl who had a recurrence of gono-

coccal vulvovaginitis about 1 month after an initial treatment, third was a 9-year-old mentally retarded girl and the fourth was a 5-year-old girl who was living with an older girl because her parents were divorced.

Contact tracing:

In all the cases, contact tracing was attempted by giving contact slips to the person that accompanied the child to the clinic, inviting all the family members and other suspected contacts to the clinic. In some cases, the health sister visited the homes or offices of some fathers to encourage them to come for investigation. Sixty-one (78.2%) index patients had some members of their family screened and 103 persons subjected themselves for laboratory investigations, out of which 27 (26.2%) were found to be positive for *Neisseria gonorrhoea* (Table 4). The result of parents' investigation showed 6 (30%) fathers and 12 (22%) mothers had positive culture for gonorrhoea (Table 3). Of all the 9 cases where specific contacts were named, only one was screened, while the others were not traceable or just refused to come to the hospital.

Marital status of parents

In all, 93% (78 of 84) of parents were married although some fathers had 2 or more wives, 4 (4.76%) were separated and 2 (2.38%) were divorced.

Table 3: Isolation of *Neisseria gonorrhoeae* from parents of index patients

Age yrs	Total screened	Fathers positive	Total screened	Mothers positive
1 - 2	4	0	8	4
3 - 4	5	2	20	3
5 - 6	4	1	5	2
7 - 8	6	2	9	2
9 - 10	1	1	13	1
Total	20	6(30%)	55	12(22%)

Table 4: Isolation of *Neisseria gonorrhoeae* from relatives of 61 children with gonococcal infection.

Relationship	No. examined	No. positive
Fathers	20	6
Mothers	55	12
Grandmothers	2	1
Sisters	7	6
Brothers	3	1*
Others	16	1**
Total	103	27 (26.2%)

*10-day-old baby whose 2½-year-old sister had G.C., her mother screened positive, but she did not take treatment before she delivered a set of twins. The 1st twin died (?cause), while the 2nd developed gonococcal conjunctivitis.

** A 16-year-old boy who assaulted his 2-year-old cousin kept in his care.

Treatment:

Seventy-five (89.3%) patients were treated with spectinomycin (Togamycin®). Other drugs given include Ciproxin, Ofloxacin,

Ciprofloxacin (Ciprotab®), Erythromycin and Cefuroxime. None of the cases was reported to have resistance to any of the drugs given.

All the patients had post-treatment check to ensure cure. They were also advised on the practice of good hygiene and the need to use separate towels and pants.

Discussion

Only a few investigators have dealt with the question of the source of gonococcal infection in pre-adolescent children. Two studies have suggested that the source of infection is most commonly parents or relatives. In 1941, Rice *et al.* [9] noted that 50% of parents of girls with gonococcal vaginitis were infected with *Neisseria gonorrhoeae*. More recently investigators reviewing cases of gonorrhoea among native Alaskan children found that in seven of 14 cases one or both parents were infected [10]. Only parents were investigated in these two studies, other family members and associates were not surveyed. In the present study, 24% of parents, i.e., 30% of fathers and 22% of mothers were infected with *Neisseria gonorrhoeae*. White *et al.* [11] found that the father or step father was the most likely perpetrator of STD especially in the older preadolescent child than the younger age group and that gonorrhoea was most likely to be contracted from non-relatives and relatives other than the father or step father. Also, the result of laboratory investigation of relatives (Table 4) showed a 26.2% positive culture, this is comparable with the finding of 27% positive culture in relatives and other contacts of index patients in a study by Folland *et al.* [3]. The finding of positive cultures in the close contacts or relatives of the children lends credence to the theory of fomite/non-sexual contact as the most probable mode of transmission of gonorrhoea to children. This is in contrast to the Zaria study, where no family members was infected, neither was there any possible role of intermediary objects [12].

In 8 of the 9 cases where positive histories of contacts was obtained, the contacts, unfortunately, were not traceable, and in other instances, the contact just refused to come for screening. Their refusal may be out of shame for their act, but they were able to escape because they have many alternatives to STC, such as drug peddlers, native doctors, patient medicine stores, and private practitioners where treatment could be obtained without screening. This has in many ways aided such people, especially men, who are likely to become symptomatic few days after contacting gonorrhoea, who will like to keep their secret to themselves. In addition, this will increase the spread of pre-pubertal gonorrhoea in this locality where there is superstitious belief that having sexual intercourse with a virgin is a good cure for gonorrhoea.

The mode of spread of *Neisseria gonorrhoea* to children has been elucidated even less than the source. However, the risk of infection depends on the prevalence of sexually transmitted infection in the abusing population, the type of assault, the organism, and the site of assault. Non-abused children can acquire sexually transmitted organisms by vertical transmission, or rarely, by non-sexual contact such as from fomites or non-sexual acts [2,3,9,11,13]. How often this occurs is controversial. The only convincing example of non-sexual spread was in the pre-antibiotic era, when 67 infants in the same hospital ward contracted gonococcal infections within a single month. Contaminated thermometers or other intermediary objects were alleged to be the vehicles of spread but such contamination was never demonstrated [14]. Also in 1971, Shore and Winkelstein contended that indirect or non-venereal contact might play a role in transmission [10]. They based their conclusion on the

observation that 5 of 14 infected children had no evidence of sexual contact, yet they had slept with infected parents. Three children had gonococcal conjunctivitis without genital tract disease. They felt this suggested indirect contact by an intermediary object (e.g. bed clothes) or hands. This study is almost similar to the finding of Osoba and Alausa (1974) in Ibadan, who showed that a number of children are infected from their mother through intermediary objects [6]. In all these studies, no culture of suspect objects (fomites) was done. In contrast to these two studies, Bello (1982) in Zaria, Nigeria, reported sexual intercourse in five of their eleven children, while two other cases were suspected to be as a result of sexual adventure [12]. In the present study, only 9 (10.7%) girls had history of sexual exposure (Table 2); while four other cases, who did not give history of sexual exposure had torn hymen. The low rate may be as a result of reluctance of health professionals to entertain the sexual molestation of a child by an adult or because it was generally assumed that the mode of transmission to children must be fomites, therefore the history of possible sexual contacts was not pursued in most of cases reviewed, even when the hymen was found torn.

Only a few investigators have suggested that most childhood gonorrhoea is acquired sexually. Employing intensive interviews, Branch and Paxton obtained a history of sexual contact in 44 of 45 (98%) infected children, between the ages of 1 and 9 years [15]. Their study was also corroborated by the study of Ingram *et al.* [16]. It is unfortunate that the contacts in the present study were not traceable except in the 2 year old girl whose cousin, aged 16 years, following positive culture of his urethral swab, confessed to have assaulted the girl who was always kept in his care.

Since an accurate history is usually unobtainable and documentary evidence for non-sexual spread is lacking, gonorrhoea, even in young children, should be considered to be sexually transmitted unless proven otherwise, and should lead to the consideration of child neglect and sexual abuse. In the present study, evidence of physical abuse was strongly suspected in only 4 cases, even in one of the cases the mother denied it despite the fact that the hymen was torn. The types of alleged sexual abuse as documented by White *et al.* [11] include, genital manipulation (most common in the younger group), oral and vaginal penetration (in older victims than the younger children), breast fondling and anal penetration; while an incomplete history was more likely to be obtained from the younger victims. These younger children were more likely to come to medical attention because of vaginal/urethral discharge or because of known sexual abuse of older siblings. In this study, 6 sisters of index patients also had gonorrhoea, but there was no record of both the source and mode of transmission.

Sgroi has charged that health professionals "because of reluctance to entertain the possibility of sexual molestation of a child by an adult ... have often postulated modes of transmission of venereal disease to children ... that was long ago discarded in relation to adults" [17]. Particularly in cases of gonococcal vaginitis, it seems likely that evidence of child abuse or neglect would more frequently be found if health professionals assumed infected children had some type of sexual contact and investigated accordingly.

While children may spread gonorrhoea by sex play, this may not be the usual source in children under 10 years of age [14,16]. Non sexual child-to-child contamination was not noted in the studies carried out by Ingram *et al.* [16] and they concluded it must be rare and therefore suggested that if a child with gonorrhoea is detected, all children in a family should be

investigated for gonorrhoea as other children in the family may also have been sexually abused. In 1998, Emele and Anyiwo found three of the nine cases of gonorrhoea in children to be by child-to-child transmission, with female peers as the initiators [8].

Gonococcal infection in children affects girls more commonly. In the previous studies emphasis was laid on vulvovaginitis only [6,7,12]. This study also confirms that girls are more at risk as 82 (97.6%) cases had vulvovaginitis while only 2 (2.4%) cases had urethritis. One of the boys actually presented with one-day history of purulent eye discharge before he was discovered to have gonococcal conjunctivitis and when his urine was examined it grew *Neisseria gonorrhoea*. In this study 7 cases (8.3%) had gonococcal infection of both the genital tract and the eyes. The eye infections were found nearly in all the age groups; however, no one had only eye infection. It is known that structures that have high affinity for the gonococcus are generally lined by columnar, cuboidal or immature epithelium, hence in young female children with relatively larger and more external areas of susceptible vulvar and vaginal epithelium, gonococcal infection is more easily acquired either directly from infected adults or indirectly through contaminated materials such as towels, beddings, toilet seats and underwear. All the girls presented with history of vaginal discharge, but some had other complaints such as vulva itching, peppery feelings and dysuria.

Vaginal discharge in children is not uncommon and in fact the commonest symptom in girls with gonorrhoea and *Chlamydia trachomatis* [13,18], but is often not reported because of unwarranted shame [19]. The discharge was described as creamy, yellowish brown or purulent. The duration of symptoms before presentation at the clinic varied widely, 1–5 days in 35.7% but as long as 1–3 years in 4.8% of cases. Children with gonorrhoea vaginitis or urethritis are usually symptomatic and may have had a discharge for as long as 8 weeks; an asymptomatic carriage of the organism may persist for up to 6 months without treatment [9,11]. This variation may be due to inability of some of the children to explain their experience to their parents and the low index of suspicion of vaginal/urethral discharge by the mothers. Since most of these children may not know what an abnormal vaginal/urethral discharge is and therefore the symptoms could have been on for some time before their mothers suspected it and when asked the mother would only give the duration of when she noticed the discharge. Another reason for the delay may be because, help could have been sought from native doctor, patent medicine store and private medical practitioners and often times it is when they meet with failure that the hospital is considered as the next port of call.

Contact tracing when assertively and thoroughly pursued is generally agreed to be the most effective method of control of STD presently available [20,21]. The most important and prominent problem observed in these cases were the high number of untraceable contacts, and the refusal of many men to come for screening. This problem of poor contact tracing was also documented by Asuzu *et al* [21] and Osoba and Alausa [6]. The fact that 26.2% (27 of 103) of all relatives; which consist of 30% of fathers and 22% of mothers screened positive confirms that contacts are usually close relatives.

Therefore, the recognition of a child with gonococcal infection identifies a cluster of family members who are at increased risk of having gonorrhoea.

The marital status of the parents did not seem to have any contribution to gonococcal infection in children, as 93% of the parents were married.

Eighty-nine percent (75 of 84) of the cases were treated

with spectinomycin (Togamycin[®]), this may be because it was the most effective drug available during most part of the years of study.

While gonorrhoea is a relatively uncommon infection in children, it must be considered a serious problem that must be investigated thoroughly. Investigation of the family members and other associates of the child will usually yield a good result by exposing persons who require therapy. Moreover, in this era of HIV infection and AIDS, young children who are sexually abused can be infected with the virus. While considering fomites as a possible mode of transmission of gonorrhoea to children, emphasis should also be placed on it being sexually transmitted; being what is more favoured by almost all studies. More effort is therefore required at finding the source and mode of transmission of gonorrhoea in children.

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ANNOUNCEMENTS

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The Journal will publish official notices of meetings, conference, seminar, etc. of societies and bodies in medicine and related medical fields.

In addition, meeting reports which should be concise statements, summarizing the happenings at meetings of medical societies could be sent for publication.

Our Error

In Volume 30, Nos 1 and 2 (March & June 2001) page 35 of our publication, the names of the author of the paper "Comparative *in-vitro* activities of commonly available quinolones and other antibiotics on bacterial isolates in Ibadan, Nigeria" which reads AA Oni, RA Bakare, AO Arowojolu, RA Kehinde Toki, NA Fasina should read AA Oni, RA Bakare, AO Arowojolu, AO Kehinde, RA Toki and MA Fasina. The mix-up is regretted.

Sir

Community-based treatment of onchocerciasis with ivermectin in southwest Nigeria: dermatological response to a singledose therapy

Introduction

Onchocerciasis is a chronic tropical parasitic disease, with a wide range of cutaneous and ocular manifestations. It is a serious public health and socio-economic problem found in about 27 countries in sub-Saharan Africa, and in parts of Latin America and the Arabian Peninsula. It is estimated that over 80 million people are at risk of infection; some 18 million infected and one million people visually impaired, of whom some 340,000 are blind¹. In Nigeria, 20 million people are at risk of infection while 10,000 are already blind. It is estimated that 1 out of 3 onchocerciasis patients in the world is a Nigerian². The two basic ecologically-related clinical and epidemiological varieties exist in Nigeria: the savannah and the rain-forest belt types of onchocerciasis. Dermatological manifestations include generalized or localized body itching, acute papular onchodermatitis (APOD), chronic papular onchodermatitis (CPOD), lichenified onchodermatitis (LOD), atrophy of the skin, depigmentation of the skin (leopard skin), and thickened and rough skin (lizard skin). Other lesions associated with onchocercal skin disease are subcutaneous nodules, lymphadenopathy, hanging groin, and lymphoedema³.

The advent of Mectizan (ivermectin, MSD) which elicits few severe adverse reactions and is effective when administered as a single oral dose once a year⁴, has changed the global strategy of control. The drug has been reported to produce immediate or at least easily discernible clinical and dermatological effects^{5,6,7}. However, few literature exist on these effects among the Nigerian population and hence the need for this study. The aim of this study therefore was to determine the prevalence of onchocerciasis-induced skin manifestations and their response to treatment with ivermectin.

Materials and method

A community-based distribution of ivermectin was carried out by trained community drug distributors (CDDs) in 12 onchocerciasis endemic communities in Egbeda Local Government Area (L.G.A.) of Oyo State, Nigeria in 1998. These communities were selected using the stratified random sampling method and were those within 10 kilometres distance from the Osun River and its tributaries out of 54 communities that are situated along the river.

A brief demographic history was obtained from each participant and recorded on an interview guide. Skin examinations were performed, classified and graded using the recently developed clinical classification and grading system for the cutaneous changes in onchocerciasis³ on all the community members who agreed to participate in the study. The examination involved probing and searching for skin manifestations of onchocerciasis such as body itching, reactive skin lesions [acute papular onchodermatitis (APOD), chronic papular onchodermatitis (CPOD), lichenified onchodermatitis (LOD)], skin atrophy, subcutaneous nodules, leopard skin, hanging groin, and enlarged lymph nodes. Particular attention was paid to the

extent of body itching and reactive skin lesions that were expected to be influenced by drug treatment. A record of this was made on an interview guide (checklist) for each studied participant who reported body itching and on whom reactive skin lesions were detected. The checklist was also used to define and score their characteristics in relation to the presence or absence, distribution, severity and activity of the lesions. Two types of cutaneous manifestations of onchocerciasis, namely body itching and dermatitis were thus assessed (Table 1). Body itching was assessed based on its presence, distribution, sleep disturbance, and whether it is consistently worse at some sites that can be specified. A minimum score of 1 and a maximum severity score of 4 could thus be obtained. With respect to dermatitis, three forms, APOD, CPOD, LOD were considered and graded on the basis of their severity and activity as seen in Table 1- all with a minimum score of 1. APOD has a maximum score of 4; CPOD, a maximum score of 3; while LOD has a maximum score of 5. Hence, for any community member recruited into the skin study, a minimum score of 1 and a maximum severity score of 12 can be obtained.

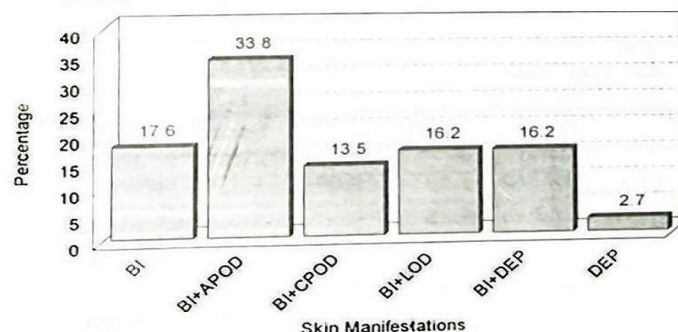
Three months after drug treatment, skin examination was repeated on the participants and observations graded and scored. The pre- and post-treatment mean scores obtained were analysed using the Student's paired t-test.

Results

Out of 485 community members who were physically examined, 74 (15.3%) were enrolled into the clinical study. They were found positive for either body itching or one form of onchodermatitis. Body itching alone accounted for 97.3% of the reported skin manifestations, while onchodermatitis accounted for 63.5%. Body itching and onchodermatitis were reported by 72 (14.8%) and 47 (9.7%) of the study population respectively. Analysis of these symptoms showed that 13 participants (17.6%) reported body itching alone, 25 (33.8%) had body itching and APOD, 10 (13.5%) had body itching and CPOD while 12 (16.2%) had body itching and LOD (Figure 1). Body itching

Figure 1

Symptom Analysis among 74 Study Participants with Onchocercal Skin manifestations



BI = Body itching

APOD = Acute papular onchodermatitis

CPOD = Chronic papular onchodermatitis

LOD = Lichenified onchodermatitis

DEP = Depigmentation.

was more prevalent among the 30 - 59 year age group, and the farmers than the other age groups and occupations. Each of these findings was statistically significant. Males were less fre-

quently affected by body itching than females (12.9% versus 16.5%), but this difference was not statistically significant ($X^2 = 0.92$; $p = 0.3362711$). The occurrence of dermatitis was more frequent among the 30 - 59 year age group (11.4%), females (10.7%), and farmers (12.3%) than the other age groups (7.4%), males (8.5%), and occupational groups (7.2%) respectively. These differences were, however, not statistically significant.

Table 1: Characteristics and scoring of clinical features

Body itching

Present = 1

Generalised = 1

Disturbs sleep = 1

Worse at specific sites = 1

Acute papular onchodermatitis

Severity: present without vesicles = 1

Present with vesicles = 2

Activity: itching without scratch marks = 1

itching with scratch marks = 2

Chronic papular onchodermatitis

Severity: present = 1

Activity: itching without scratch marks = 1

itching with scratch marks = 2

Lichenified onchodermatitis

Severity: present = 1

Present with partially confluent plaques = 2

Present with large confluent plaques = 3

Activity: itching without scratch marks = 1

itching with scratch marks

At 3 months after treatment with ivermectin, 62 (83.8%) of the study population were available for a repeat skin examination. Six participants did not receive treatment, 4 could not be found while 2 were reported to be dead. Out of the 62 participants who were re-examined and scored, the lesion had disappeared completely in 15 (24.2%), 36 (58.1%) recorded some improvement, 7 (11.3%) remained the same, and the disease appeared worse in 4 (6.4%) subjects. The difference in the pre- and post-treatment mean scores was strongly statistically significant ($t = 5.3398$; $p < 0.001$). Each of the cutaneous manifestations, body itching and onchodermatitis, also showed significant improvement at 3 months after treatment (Table 2).

Table 2: Analysis of pre- and post-treatment mean scores of skin manifestations

	Time	No.	Mean	Std. Dev.	t-test	p-value
BI+OD	1	62	8.48	4.08	5.3398	<0.001
	2	62	4.47	4.28		
BI	1	62	3.77	1.20	8.9980	<0.001
	2	62	1.40	1.65		
OD	1	47	4.82	2.26	5.5319	<0.001
	2	47	1.97	2.29		

N.B. Data represent the means of total scores obtained at baseline and second skin examinations.

BI= body itching

OD= onchodermatitis

Discussion

Only a few studies have reported the effect of treatment with

ivermectin on the cutaneous manifestations of onchocerciasis. However, prevalence studies on the reactive onchocercal skin lesions abound in the literature. The reported prevalence levels by other investigators had ranged from 10% to 39%^{8,9}. These were comparable with the prevalence of 15.3% obtained in this study. Troublesome body itching was reported by 14.8% of the study population. This finding was surprisingly low when compared with findings of other similar studies which have reported 55% prevalence¹⁰. The low prevalence of troublesome body itching obtained in this study could be due to the stringent criteria such as its distribution, sleep disturbance and whether it is consistently worse at some specific sites or not that were considered in order to be eligible for the study. A large number of community members with vague and unspecific body itching were discounted because they could not satisfactorily fulfill the criteria. However, the prevalence level of 9.7% obtained for onchodermatitis in this study was similar to that reported by the Pan-African Study Group on Onchocercal Skin Disease, (1995)⁹.

The significant improvement observed on onchodermatitis and body itching in this study was consistent with the results obtained at first skin examination of the ivermectin group done at either 3 or 6 months by other investigators^{5,6,7}. In this study, one follow-up skin examination was done after treatment where in one group, the skin lesions had markedly improved and in some cases, disappeared completely. In the second group of subjects whose condition was unchanged, the multiple skin lesions were either unchanged or a slight improvement recorded in one lesion while the other worsened. The third category of subjects whose clinical status got worse had all experienced more intense body itching due to a worsening of their skin lesions. Two of them had recently developed APOD lesions on the upper back and underneath the breastfolds. Other previous studies that have carried out multiple follow-up visits, however, have shown that the ivermectin group maintained a greater reduction in the prevalence and severity of skin lesions over time than the placebo group.

Conclusion

This study has shown that the cutaneous manifestations of onchocerciasis infection, especially body itching and onchodermatitis responded satisfactorily to treatment with ivermectin. The drug has, therefore, proven to be an acceptable alternative to treatment with diethylcarbamazine citrate that has been plagued by unacceptable adverse reactions. However, a longer period of study is required to fully appraise its effect on skin lesions.

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