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# Incidence and Clinical Manifestation of Onchocerciasis in Endemic Foci of Ilubabor Province, Ethiopia.

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**Abstract**

Onchocerciasis is a common disease in south-west Ethiopia. Authors undertook field surveys to study this filarial disease in Abdella and Didessa Villages of Ilubabor Province. Two skin snips were taken from the left buttock and calf, respectively, and microfilariae emerged from skin snips were identified as those of *Onchocerca volvulus* by measurements of the size and the anatomical landmarks. In both villages, fewer females were affected than males, and older age groups showed a higher percentage of onchocerciasis than the younger ones. The microfilarial density of the buttock and calf was almost the same in the similar condition of the skin. Clinical manifestations possibly caused by onchocerciasis were subcutaneous nodule, pruritus, skin changes, enlarged lymph nodes and swollen legs. The skin changes included the pigment changes, hypertrophy and atrophy of skin, and in the legs studied, elephantiasis, mossy skin, nodular skin and edema were involved. In all of 4 patients treated with Hetrazan for 32 days, a remarkable decrease of microfilarial density was observed. Two months later, the patients were free from severe itching.

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## Introduction

Onchocerciasis is one of the common diseases in the south-west Ethiopia. In 1939, Bucco et al demonstrated for the first time the presence of *Onchocerca volvulus* infections in Keffa Province, Ethiopia. Later, several investigators have described the clinical manifestation and the epidemiology of onchocerciasis in Ethiopia. In 1971 the present authors made several field surveys to study this filarial disease in Ilubabor Province, Ethiopia. In this article, the authors describe clinical manifestations observed in onchocerciasis cases.

## Geography and Places studied

Ethiopia is a mountainous country with peaks whose altitude ranges between 2,300 and 2,500 m from the sea level. The Rift Valley splits the country from north to south. This valley is about 320 km wide near the Red Sea coast but as it extends to the south-west direction, the valley narrows and breaks into long. Although Ethi-

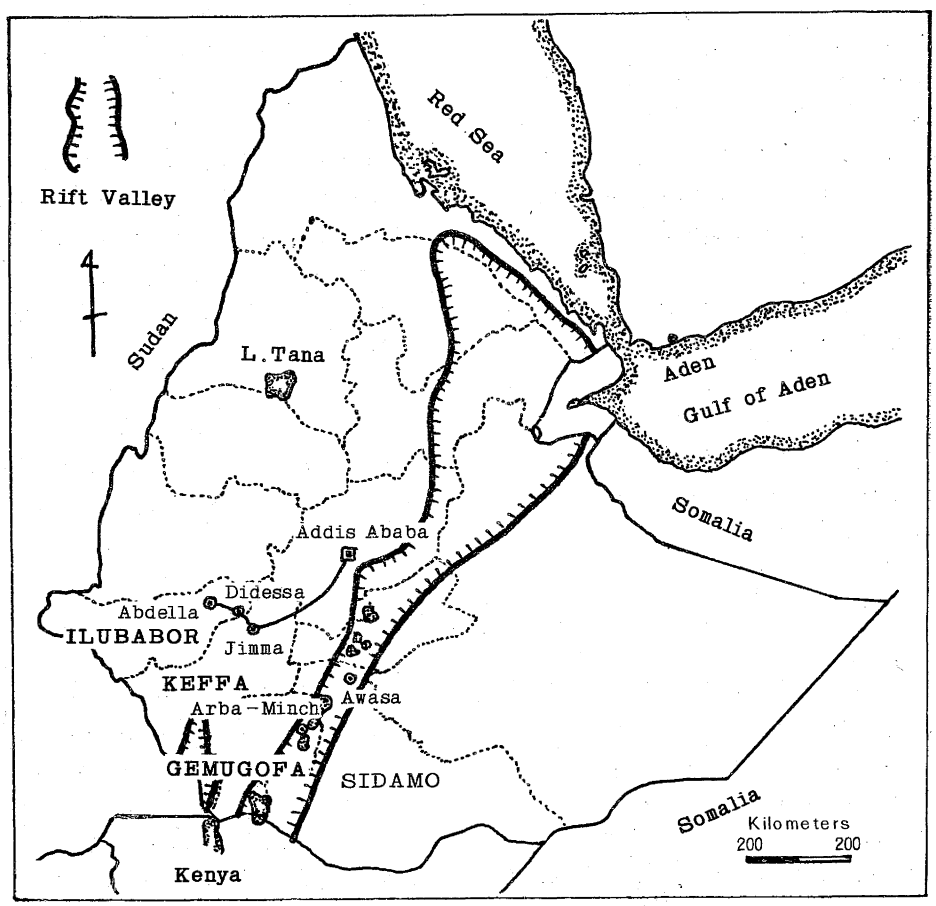


**Fig. 1** Map of Ethiopia showing the places studied.

opia is within torrid zone, sometimes the temperature reaches the freezing point at the highest elevation. The main rainy season is a period between June to September and the dry season begins on November and ends in February. Abdella and Didessa where the authors made their studies are located in south-west Ethiopia, and their altitude is about 2,000 and 1,900 m, respectively. The so called "all-weather" road leads to Abdella and Didessa through Jimma from Addis Ababa, the capital city. The Didessa River runs through Didessa and flows into Blue Nile and the Dabana River runs across Abdella Village (Fig. 1). These rivers were considered to play some important roles to breed vector *Simulium*.

## Materials and Methods

a) Skin snip technique: Two skin snips were taken from left buttok and calf from each person. The skin snips were teased into a few fragments by using sharp edged forceps and an entomological dissection-needle and incubated in drops of physiological saline solution on slides for 15 minutes. The presence of microfilariae was examined under microscope without cover slip. The techniqe mentioned above was due to the recommendation by Duke (1962).

b) Measurement of microfilariae: Microfilariae emerged from skin snip were dried at room temperature and stained in 5% solution of Giemsa in phosphate buffer solution (pH 6.8) for 30 minutes and decolorized in pure alcohol. Stained microfilariae were projected on a Nikon microscope screen for the measurement of the following anatomical landmarks; the length, width and cephalic space, nerve ring, G-1 cell and anal pore. Individual landmarks are expressed in percentage of the distance from the tip of the cephalic end in the total body length.

c) Treatment with diethylcarbamazine (Hetrazan): Four patients with onchocerciasis and elephantiasis of the scrotum and lower legs were hospitalized and treated with Hetrazan. The initial dose of Hetrazan was 1 tablet (50 mg) per day, and doubled after 3 days, trebled for 2 days after a further 4 day treatment, and quadrupled for 25 days after the patients have been released from the hospital.

## Results and Discussions

a) Microfilaria: The microfilariae emerged from skin snips shows a coiling and twisting movement. They are without sheaths and with almost uniform shape except the anterior end and nuclei-free part of the posterior end. The anterior end is bluntly rounded and the posterior one abruptly narrowed (Fig. 2). The average body length of 52 stained microfilariae is 255.9 $\mu$, and the width, 5.8 $\mu$. The various anatomical landmarks measured are as follows: length of nuclei-free anterior cephalic space is 2.8%, nerve ring, 24.1%; G-1 cell, 69.5%; and anal pore, 82.9%; respectively. Although micro-

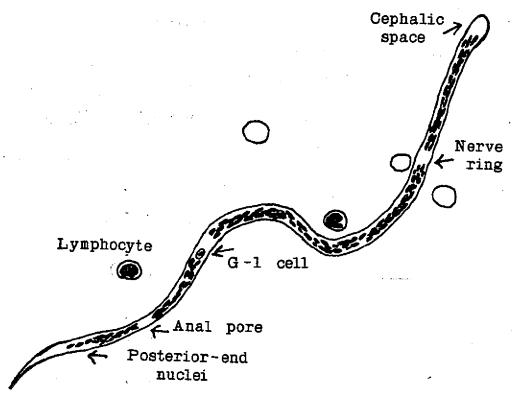


**Fig. 2** Showing a microfilaria of *O. volvulus*.

filariae of *Acanthocheilonema streptocerca* should be differentiated from those of *O. volvulus*, the present microfilariae lack terminal nuclei and the size of the latter is larger than those of *A. streptocerca*. Further, the nerve ring is located at 24.1% in our specimens while that of *A. streptocerca*, at 27.0%. From the observations mentioned above, the authors identified the present microfilariae as those of *O. volvulus*.

b) Incidence of positive onchocerciasis cases : Out of 136 persons examined in Abdella, 70 showed microfilariae, and out of 54 persons examined in Didessa, 36 were also positive. According to the classification by WHO (1966), Abdella and Didessa villages are considered as meso-endemic areas (Table 1 and 2).

Oomen (1967 a) carried out onchocerciasis surveys at 38 places in south-west Ethiopia and the microfilaria rate obtained was 12% in Agaro, 42% in Bedele and 72% in Dabana. Present studies showed that females are less affected than males and the microfilaria rate increased according to the rise of ages in both Abdella and Didessa, as shown in Tables 1 and 2.

c) Microfilaria density(MFD).

The correlation coefficient (r) obtained was 0.81 between MFD of two sites examined. From this experiment, the authors reach a conclusion that even a single skin snip is enough for the diagnostic purpose and for the estimation of MFD. Kershaw et al (1954) concluded that the concentration of microfilariae was very closely related to the condition of the skin where the snip was taken. Table 3 and 4 show the age distribution of the positives in the persons examined. The MFD is higher in proportion to the increase of age. This finding shows that the older people might have been exposed to the vectors for a long time in comparison with the younger one.

d) Clinical manifestations.

The signs and symptoms possibly caused by onchocerciasis were documented in "onchocerciasis record sheet"(Table 5).

*Onchocercomata* : Out of 136 people examined, only 9 of them had subcutaneous nodules situated mostly on the iliac crest, ribs, and shoulder girdle (Fig.3) and they were of bean size. Only one case with two nodules was seen. In contrast to this, the onchocercomata found in Central America is localizd mostly on the scapula and skull while in Africa they are mostly found on the great trochanter, scapula, ribs, elbow, and knee. Oomen (1969) reported that the nodules in most of the cases, are seen on the chest and pelvic region in Keffa, Ethiopia. The reason for the difference in localization of the onchocercomata in the regions mentioned above still remains unknown. It might be due to onchocercal strains, geographical difference and other unknown causes. A comparative study on the pathogenecity and infectivity on different strains might throw some light on this problem.

*Pruritus* ; In case of onchocercal infection, the first skin change is a rash associated

**Table 1.** The age-group incidence of positive onchocerciasis arranged by sex in Abdella (Ilubabor province, Ethiopia)

| Age-group* | | No. cases examined | No. positive | percent positive |
|---|---|---|---|---|
| Child | M. | 12 | 3 | 25.0 |
| | F. | 7 | 0 | 0.0 |
| Young | M. | 10 | 4 | 40.0 |
| | F. | 10 | 3 | 30.0 |
| Adult | M. | 51 | 41 | 80.7 |
| | F. | 25 | 8 | 32.0 |
| Old | M. | 11 | 6 | 54.5 |
| | F. | 10 | 5 | 50.0 |
| Total | M. | 84 | 54 | 64.7 |
| | F. | 52 | 16 | 30.7 |
| | Total. | 136 | 70 | 51.4 |

*Child ; below 10 yrs. old, Young ; 11-19 yrs. old, Adult ; 20-25 yrs. old, Old ; 50 yrs. old or more

**Table 2.** The age-group incidence of positive onchocerciasis arranged by sex in Didessa(Ilubabor Province, Ethiopia).

| Age-group | | No. cases examined | No. positive | Percent positive |
|---|---|---|---|---|
| Child | M. | 2 | 2 | 100.0 |
| | F. | 3 | 1 | 33.3 |
| Young | M. | 4 | 3 | 75.0 |
| | F. | 0 | 0 | - |
| Adult | M. | 28 | 20 | 71.4 |
| | F. | 14 | 8 | 57.1 |
| Old | M. | 2 | 1 | 50.0 |
| | F. | 1 | 1 | 100.0 |
| Total | M. | 36 | 26 | 72.3 |
| | F. | 18 | 10 | 55.1 |
| | Total. | 54 | 36 | 66.7 |

**Table 3.** Frequency distribution of microfilaria positives shown in the inhabitants arranged by the classified MFD and age-groups in Abdella.

| Age-group | MFD from left buttock (left calf) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2-3 | 4-7 | 8-15 | 16-31 | 32- |
| Child | 16(17) | 1(0) | 1(0) | 0( 1) | 1(0) | 0(1) | 0(0) |
| Young | 13(15) | 1(0) | 1(1) | 1( 2) | 1(1) | 2(1) | 1(0) |
| Adult | 28(30) | 1(7) | 6(7) | 5(13) | 19(8) | 8(5) | 9(6) |
| Old | 10(11) | 1(1) | 1(2) | 4( 1) | 1(2) | 0(1) | 4(3) |
| Total | 67(73) | 4(8) | 9(10) | 10(17) | 22(11) | 10(8) | 14(9) |

**Table 4.** Frequency distribution of microfilaria positives shown in the inhabitants arranged by the classified MFD and age-groups in Didessa.

| Age-group | MFD from left buttock(left calf) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2-3 | 4-7 | 8-15 | 16-31 | 32- |
| Child | 3(2) | 0(0) | 0(1) | 1(1) | 0(0) | 0(1) | 1(0) |
| Young | 2(1) | 0(0) | 2(1) | 0(1) | 0(0) | 0(1) | 0(0) |
| Adult | 19(21) | 4(2) | 4(2) | 1(5) | 4(5) | 4(3) | 6(4) |
| Old | 1(3) | 0(0) | 1(0) | 1(0) | 0(0) | 0(0) | 0(0) |
| Total | 25(27) | 4(2) | 7(4) | 3(7) | 4(5) | 4(5) | 7(4) |

**Table 5.** Clinical manifestations observed in 136 patients

| Signs | Frequency |
|---|---|
| Onchocercomata | 9 |
| Pruritus | 104 |
| Skin changes | 49 |
| Enlarged lymphnodes | 92 |
| Swollen leg | 27 |
| Total | 136 |

with pruritus (Rodger, 1962). In the present study, most of the patients showed skin scratches as it is shown in Fig. 4.

*Skin changes* ; The depigmentation of the skin is with irregular outline and localized mostly in pretibial region (Fig. 5) and skin atrophy is common and situated mostly below the waist (Fig. 6).

*Lymphadenopathy* ; Out of 136 persons clinically and parasitologically examined, 92 of them had remarkably enlarged inguinal or femoral lymph nodes or both as it is shown in Fig. 7, and were of hard consistency. In the lymph node materials histo-pathologically investigated, numerous microfilariae were found. In these areas, the inguinal and femoral lymph nodes were simultaneously found affected. This type of adenopathy may frequently be caused by tuberculosis, lymphogranuloma, chancroid, syphilis, and nonspecific infections. The histo-pathological findings in association with elephantiasis of the scrotum and lower legs are presented and discussed in an another manuscript under preparation (Wonde et al, 1973 in press).

*Relationship between MFD and clinical manifestation*

Table 6 shows the incidence of clinical manifestations arranged by MFD. The skin change seems to occur frequently in cases with low MFD while the frequency of enlarged nodules, skin change of leg and lymphadenopathy appears to be in correlation with higher MFD. Kershaw et al(1954) found also few microfilariae in severely affected cases such as fibrosis, atrophy, scarring or so-called crashed tissue paper or lizard skin.

*Treatment with diethylcarbamazine*; Table 7 demonstrates the record of patients treated with Hetrazan, all of them with elephantiasis and lymphadenopathy. Three of them had severe itching all over the body. They were treated for 32 days and re-examined two months later. A remarkable decrease of the severe itching was noted.

**Table 3.** Incidence of clinical manifestation among the inhabitants arranged by MFD in Abdella.

| MFD* | No. of case | Pruritus | skin-changes | oncho-cercomata | swollen leg | swollen lymphnodes | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | inguinal | femoral | both | Total |
| 0 | 67 | 51 (76.1)** | 18 (26.9) | 1 ( 1.5) | 9 (13.4) | 18 (26.9) | 2 ( 3.0) | 13 (19.4) | 33 (49.3) |
| 1 | 4 | 3 (75.0) | 3 (75.0) | 0 ( 0.0) | 0 ( 0.0) | 1 (25.0) | 0 ( 0.0) | 2 (50.0) | 3 (75.0) |
| 2- 3 | 9 | 6 (66.7) | 5 (55.6) | 1 (11.1) | 0 ( 0.0) | 2 (22.2) | 0 ( 0.0) | 4 (44.4) | 6 (66.7) |
| 4- 7 | 10 | 7 (70.0) | 2 (20.0) | 1 (10.0) | 2 (20.0) | 4 (40.0) | 0 ( 0.0) | 6 (60.0) | 10 (100.0) |
| 8-15 | 22 | 18 (81.8) | 8 (36.4) | 2 ( 9.1) | 5 (22.7) | 6 (27.3) | 1 ( 4.6) | 12 (54.6) | 19 (86.4) |
| 16-31 | 10 | 8 (80.0) | 5 (50.0) | 2 (20.0) | 3 (30.0) | 2 (20.0) | 0 ( 0.0) | 7 (70.0) | 9 (90.0) |
| 32- | 14 | 11 (78.6) | 8 (57.1) | 2 (14.3) | 8 (57.1) | 3 (21.4) | 0 ( 0.0) | 9 (64.3) | 12 (85.7) |

* microfilaria count per single snip in this observation.

** percentage of individual incidence per cases classified.

**Table 7.** Record of 4 onchocerciasis patients administered with diethylcarbamazine in Abdella.

| Name | Age | Sex | clinical manifestation | | | | | MFD from left buttock before and after treatment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | No. of oncho-cercomata | skin changes | pruritus | swollen leg | swollen inguinal & femoral lymphnodes | before | 24hrs. | 3 months |
| A.J. | old | M | 1 (left back) | atrophy, depigmentation | severe | both feet | bilateral | 160.6 | 92.5 | — |
| M.R. | adult | M | 0 | none | severe | both feet | bilateral | 3.3 | 0.1 | 11.0 |
| K.D. | adult | M | 0 | atrophy | severe | both feet | bilateral | 26.5 | 2.2 | 4.3 |
| I.H. | adult | M | 0 | none | none | scrotum | bilateral | 22.0 | 0.3 | 0.6 |

## Summary

1. The microfilariae from skin snips are measured and the anatomical landmarks are presented. The microfilariae were identified as those of *O. volvulus* based in these features.

2. Abdella and Didessa Villages are classified as meso-endemic areas of the onchocerciasis infection.

3. Based on the comparative studies on MFD between the sites of buttock and

calf, the authors conclude that a single skin-snip from one of those is sufficient to estimate it.

4. Onchocercomata have been observed mostly around the iliac crest, ribs, and shoulder girdle. The localization of the nodules is different from those of Central America. The enlargement of the inguinal and femoral lymph nodes was a common findings in the people inhabiting the areas surveyed. Elephantiasis of the scrotum and lower legs was also noted.

## Acknowledgement

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# エチオピア国イルバボール州における オンセルカ症に関する研究

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## 摘　　要

1967年に Oomen がエチオピア南西部においてオンコセルカ症の詳細な研究を行なって以来，この地方に於けるオンコセルカ症の重要性が明らかとなった．1971年著者等は同じくエチオピア南西部に位置するイルバボール州の Abdella 及び Didessa の両部落に於いてオンコセルカ症に関する疫学的，臨床的なフィールド調査を行なった．調査方法としてふくらはぎ又は臀部より径2～3㎜の皮膚切片をとり，ミクロフィラリアの有無を調べた．得られたミクロフィラリアはその性状及び解剖学的計測値より *Onchocerca volvulus* と考えられた．調査を行なったAbdella 部落では51.4%，Didessa 部落では66.7%とともに高い感染率を示し，特に成年男性においては両部落で80.7%と71.4%という高い感染率を示した．オンコセルカ症によると思われる臨床的所見は主として全身の掻痒感，皮膚における脱色素斑，肥厚及び弛緩，そけい及び大腿リンパ節の肥大，下肢の肥大等がみられた．また，オンコセルカ症が直接の原因であるかどうかは不明であるが，下肢に於ける象皮病も多数みられた．更にこれらの臨床症状をミクロフィラリア密度（MFD）との関係でみると，掻痒感は MFD と相関がなく殆んどの人に存在する．皮膚及び下肢に於ける変化は MFD に比例している．

ミクロフィラリア保有者4名を入院させ DEC を投与してみると副作用としてつよい掻痒感がみられたが，24時間後には MFD は激減していた．


**Fig. 3** A nodule on the rib, Onchocercoma

**Fig. 4** Scratches shown in the back and buttock region due to severe itching by pruritus.

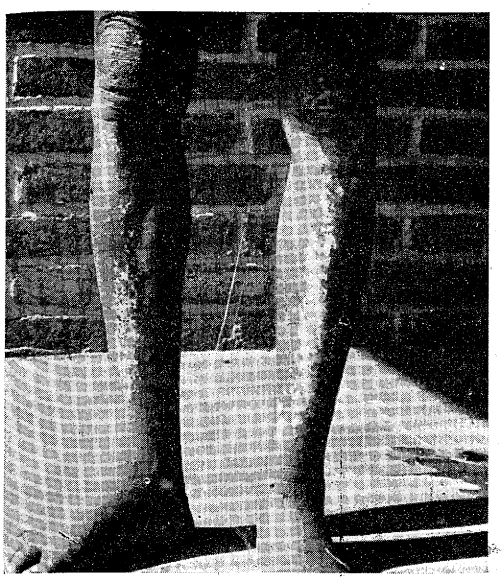

**Fig. 5** Spotty depigmentation of the pretibial region.

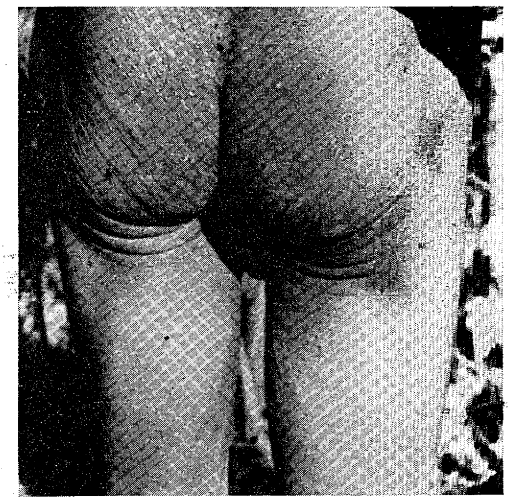

**Fig. 6** Atrophy of the buttock skin like a "crashed tissue paper".

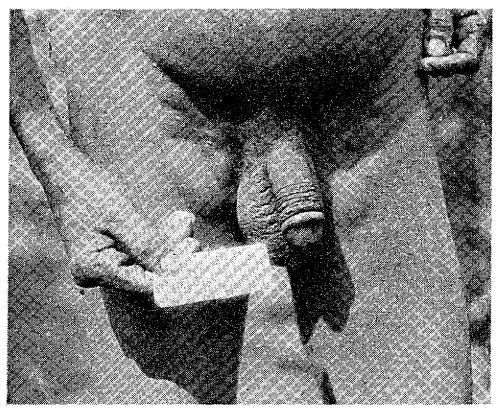

**Fig. 7** Enlargedinguinal and femoral lymph-nodules in bilateral sites.