

# Onchocerciasis In Different Regions Of Ethiopia

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## Abstract

Onchocerciasis is a disease of public health and socio-economic importance in Ethiopia. There is a scarcity of comprehensive data on onchocerciasis in Ethiopia. Thus this study is done to obtain information on the magnitude and distribution of onchocerciasis in different parts of Ethiopia. A literature based survey using published and unpublished articles was used to collect the data. A total of 12445 study subjects from 21 articles were selected and included in the study. The highest prevalence (85.3%) recorded in Teppi, southwestern Ethiopia and the lowest (6.9%) from the Kuwara province of Northwest Ethiopia. Onchocerciasis was higher in males than females and more common in middle age groups than other age groups. This study clearly shows the existence and severity of onchocerciasis in many parts of Ethiopia mainly in the Southwestern Ethiopia. A country wide study about ocular and non-ocular onchocerciasis and economical impacts caused by the disease should be implemented.

## INTRODUCTION

Onchocerciasis, commonly known as river blindness, is endemic in many tropical countries but mainly in the equatorial regions of Africa. Out of the estimated 18 million infected people worldwide more than 80% live in Africa (1). Onchocerciasis was first reported in southwestern Ethiopia in 1939 by Italian investigators. Transmitted by the bites of black flies found near the fast-flowing rivers. (2).

A complete national survey (1997-2004) in Ethiopia determined that onchocerciasis was much more wide spread than originally believed. Nine regions were shown to be endemic, with 7.3 million people at risk and more than 3 million already infected (2).

The endemic areas extend from the northwest part to southwest part of the country that borders the Sudan (1). Manifestations of the disease in Ethiopia is mainly dermal that are characterized by the disabling itching and thickening of the skin, hanging groin etc. Blindness, a common manifestation of this disease in West Africa, is a rare complication in Ethiopia (1).

Onchocerciasis is a skin disease of public health, and socio-economic/socio-cultural importance in Ethiopia (3). There is a scarcity of comprehensive data on the incidence and prevalence of onchocerciasis in Ethiopia. Thus this study is done to obtain information on the magnitude and distribution of onchocerciasis by age and sex in different parts of the

Ethiopia.

## METHODOLOGY

A literature based survey was done in School of Medical Laboratory Technology, Jimma University, Ethiopia from September 2006 to November 2006. Published and unpublished articles that deal with the onchocerciasis in Ethiopia were used to collect the data.

The sample articles were selected and the significant information was collected using a prestructured questionnaire as per the objective of the study. As much as possible the original sense of the articles was maintained. The collected data was described using simple description statistics and any association of onchocerciasis positivity with socio-demographic characteristics, age and sex was determined and interpreted according to the objective.

The questionnaires contained questions on article/journal details, demographic, study details, disease magnitude, prevalence, disease manifestations, occupation etc.

## RESULT:

In this study many journals and written articles has been surveyed to assess about onchocerciasis in Ethiopia. A total of 12445 study subjects from 21 articles were selected and included in the study. Table 1 summarizes the distribution of studies in different areas of the country listing study area, sample size, Age ranges and prevalence in chronological

order.

**Figure 1**

Table 1: Distribution of studies of onchocerciasis in different areas of Ethiopia and their prevalence in chronological orders.

S.No.	Authors	Year	Study area	Age range	Sample size	Prevalence
1	Oomen A.P.(4)	1967	Jimma, SWE*	1-30	1087	31.1%
2	Biru and Semu (5)	1974	Metema-Humera, NWE*	20-39	19	63.0%
3	Tancheff S et al (6)	1983	Bebeka, SWE*	NA*	1,611	30.9%
4	Zem A.Z. (7)	1986	Sudan border, NWE*	NA*	1370	21.0%
5	Seyoum T. et al. (8)	1987	Bebeka, SWE*	1-45	425	42.4%
6	Hailu Y. et al. (9)	1987	Bure area	0-60	471	24.6%
7	Gundersen SO. et al.(10)	1988	Blue Nile valley, WE*	NA*	477	38%
8	Asefa A. et al. (11)	1992	Gereb & Kishu, SWE*	1-60	202	34.5%
9	Haltamu and George (12)	1992/3	Kafa Zone, SWE*	10-15	1337	15.6%
10	Jira C. (13)	1993	Blue Nile valley, WE*	NA*	493	34%
11	Woldehail W. et al. (14)	1993	Teppi, SWE*	NA*	198	32.7%
12	Nesibu A. et al. (15)	1994	Pawa, WE*	5-45	988	31.4%
13	Taye A. et al. (16)	1994/95	Gilgel Ghibe, SWE*	NA*	228	1%
14	Asrat H. et al. (17)	1996	Teppi, SWE*	15-60	911	85.3%
15	Geneme M. et al. (3)	1997	Teppi, SWE*	11-78	308	81%
16	Rahel L.*	1999	Agaro, SWE*	1-45	320	25.3%
17	Mengistu G. et al. (18)	1999	Teppi, SWE*	NA*	421	84%
18	Manale B.*	2002	Kishu, SWE*	5-45	188	44%
19	Enk C.D. et al. (19)	2002/3	Kuwara, NWE	4-80	1200	6.9%
20	Eshetu N.*	2004	Kishu & Gereb, SWE*	5-45	100	59%
21	Zemenu B.*	2005	Shebe, SWE*	10-65	95	28.4%

\*Southwest Ethiopia, \*Northwest Ethiopia, \*West Ethiopia, \*Not available

\*Unpublished data: Rahel L. 1999. Onchocerciasis in Gomma wereda, Agaro, SWE. BSc Research paper, SMLT, Jimma University, Ethiopia. Manale B. 2002. Prevalence of onchocerciasis in Kishu village, SWE. BSc Research paper, SMLT, Jimma University, Ethiopia. Eshetu N. 2004. Comparison of Diethylcarbamazine patch test and direct skin snip microscopic examination for detection of onchocerciasis, SWE. BSc Research paper, SMLT, Jimma University, Ethiopia. Zemenu B. 2005. Prevalence of onchocerciasis in Shebe Health Centre, BSc Research paper, SMLT, Jimma University, Ethiopia.

Based on their contents some studies were selected and studied for the age and sex distributions in each study areas. Table 2 summarizes the infection rate of different studies by sex. Table 3 and 4 summarizes the infection rates in different studies for ≤14 years age and above 14 years age groups in both sexes.

85.3% is the highest point prevalence recorded in workers of a coffee plantation firm in Teppi, Keficho-Shekicho zone, south western Ethiopia, in a cross sectional study done by Asrat H, et al in 1996. The lowest point Prevalence is recorded in a study done in 2002/3 on Ethiopian immigrants in Israel from the Kuwara province of North West Ethiopia by Claes D Enk, et al which is 6.9%

The prevalence of onchocerciasis in males is found higher than females in almost all of the studies (Table 2). The highest and the lowest male prevalence found are 88.3% and 19% in workers of a coffee plantation firm in Teppi, by Asrat H, et al and in Gilgel Ghibe, south western Ethiopia by Taye A, et al respectively.

**Figure 2**

Table 2: Prevalence of Onchocerciasis in Male and Female subjects of some of the studies.

S.No.	Authors	Sex			
		Male		Female	
		No. Examined	Infected No. (%)	No. Examined	Infected No. (%)
1	Oomen A.P.(4)	765	215(28.1%)	322	15(4.7%)
2	Biru and Semu (5)	19	12(63%)	0	0(0%)
3	Seyoum T. et al. (8)	268	144(53.7%)	137	36(22.9%)
4	Hailu Y. et al. (9)	231	69(29.9%)	240	47(19.6%)
5	Asefa A. et al.(11)	133	79(59.4%)	69	31(44.9%)
6	Haltamu and George (12)	728	167(22.9%)	609	40(6.6%)
7	Nesibu A. et al.(15)	620	268(43.2%)	366	42(11.5%)
8	Taye A. et al. (16)	NA	19%	NA	14%
9	Asrat H. et al. (17)	673	596(88.3%)	233	180(76.8%)
10	Geneme M. et al. (3)	200	NA	108	NA
11	Rahel L.*	193	49(25.1)	123	33(25.6%)
12	Manale B.*	108	51(47.2%)	80	35(40%)
13	Eshetu N.*	59	36(61%)	41	23(39%)
14	Zemenu B.*	70	20(31.4%)	25	5(20%)

\*Unpublished; NA: Not available

The highest female prevalence is also recorded in workers of a coffee plantation firm in Teppi, which is 76.6%, and the lowest is recorded in Jimma southwestern Ethiopia, which is 4.7% in a study done by A.P. Oomen in the year 1967.

All studies reported that the onchocerciasis prevalence is lower in lower age groups than higher age groups (Table 3 and 4). In studies done by Zemenu B and Rahel L in the southwestern parts of Ethiopia the prevalence in less than 14 years ages were 0 and the prevalence in above 14 were 29.7% and 25.5% respectively.

**Figure 3**

Table 3: Infection rates in males & females of ≤ 4 years old age group in some of the studies.

S.No.	Authors	Total No.	Male		Female		Prevalence
			No. Examined	Infected No. (%)	No. Examined	Infected No. (%)	
1.	Oomen A.P.(4)	103	67	8(11.9%)	36	0(0%)	7.8%
2.	Seyoum T. et al. (8)	90	NA	NA	NA	NA	20%
3	Asefa A. et al. (11)	45	32	12(37.5%)	13	7(53.8%)	42.2%
4	Nesibu A. et al. (15)	223	134	48(35.8%)	89	7(7.9%)	24.7%
5	Rahel L.*	2	1	0(0%)	1	0(0%)	0%
6	Manale B.*	8	5	2(40%)	3	0(0%)	25%
7	Zemenu B.*	4	3	0(0%)	1	0(0%)	0%

\*Unpublished; NA: Not available

**Figure 4**

Table 4: Infection rates in males & females of >14 years old age group in some of the studies.

S.No.	Author	Total No.	Male		Female		Prevalence
			No. Examined	Infected No (%)	No. Examined	Infected No (%)	
1.	Oomen A.P.(4)	984	698	20(29.7%)	286	15(5.2%)	22.6%
2	Seyoum T. et al. (8)	335	NA	NA	NA	NA	48.3%
3	Asefa A. et al. (11)	157	101	67(66.3%)	56	24(42.8%)	58%
4	Nesibu A. et al. (15)	763	486	275(56.8%)	277	49(17.7%)	42.3%
5	Rahel L.*	318	194	49(25.25%)	124	32(25.8%)	35.3%
6	Manale B.*	180	103	49(47.5%)	77	32(41.5%)	43.0%
7	Zemenu B.*	91	67	22(32.8%)	24	5(20.8%)	29.7%

\*Unpublished; NA: Not available

In a study conducted by Zein AZ in northwestern Ethiopia the infection rate in men was found about three times that for women.

Hailu Y et al has reported the onchocercal prevalence in age group 0-19 and 20-60 are 10.5% and 48.7% respectively in case of males and 6.95% and 31.2% respectively in case of females.

Zemenu B in his study on mixed occupational distribution subjects in Shebe southwestern Ethiopia, reported the onchocerciasis prevalence in farmers (66.7%), merchants (14.8%), government employees (7.4%) and in house wives (11.1%).

In majority of the studies the seasonal variation for the transmission was not discussed but in studies in Metema-Humera by Biru M et al and in Teppi coffee plantation by Asrat H et al, the transmissions were limited in the short-rainy season of the year and perennial through out the year respectively.

The clinical features seen in the majority of the studies were itching, acute skin lesions such as papules, excoriation, dermal oedema, inguinal and femoral lymphadenopathy and chronic skin lesions like pruritus, atrophy, hyperkeratosis, dyspigmentation and elephantiasis. . And also signs of ocular onchocerciasis were recorded in some of the studies.

Of the 65 patients who underwent a thorough eye examination, 45 patients (66%) had ocular complaints. Corneal abnormalities were found in 55 of the 130 eyes (42%), active anterior segment intraocular inflammation and live microfilariae were found in 4 eyes (3%) and lens changes in 16 eyes (1 %). Eleven eyes (9%) showed retinal or choroidal changes in a study done in 2002/3 on Ethiopian immigrants in Israel from the Kuwara province of North West Ethiopia by Enk C.D, et al.

In Asefa A et al's study visual impairment was reported in 34 of whom six were identified as cases of ocular onchocerciasis (four early choroidoretinitis, one chronic iritis and one punctate keratitis/cataract). The two cases of blindness are probably attributed to non-onchocercal glaucoma and cataract. (Asefa et al, 1995)

## DISCUSSION

This study shows different levels of endemicity in several foci of western, north western and southwestern parts of the Ethiopia. Majority of the studies were done on the southwestern parts of the country. Studies conducted in Teppi recorded the highest prevalences as 85.3%, 84%, 82.7% and 81% by Asrat H et al, Mengistu G et al, Workneh W et al, and Genene M et al respectively (<sup>3, 4, 17,18</sup>) .

These high prevalences could be due to the large number of rivers flowing in the forests of Teppi for a considerable period of the year maintains both high levels of transmission as well as intensity of the disease (<sup>17</sup>).

The slight differences in the prevalences could be due to the difference in study methodologies, study population, sample size and the time difference among the studies. In two studies conducted in Bebek, the point prevalence of onchocerciasis determined in 1983 by Tatischeff S et al is 30.9% (<sup>6</sup>) and in 1987 by Seyoum T et al is 42.4% (<sup>8</sup>). Such increasing prevalences could be due to the increase in the extent of the disease propagation through time.

Among male persons the prevalence of onchocerciasis was higher than among the female population in almost all of the studies.

This could be due to frequent visits to forests and riverbanks as well as the habit of wearing light clothes by males than females.

But in some studies (<sup>16</sup>, \*Rahle L, \*Manale B) there was no marked difference in the prevalence between sexes. This possibly indicates that both males and females were equally involved in activities in these areas. (\*Unpublished: Rahel L. 1999. Onchocerciasis in Gomma wereda, Agaro,SWE. BSc Research paper, SMLT, Jimma University, Ethiopia. Manale B. 2002. Prevalence of onchocerciasis in Kishe village, SWE. BSc Research paper, SMLT, Jimma University, Ethiopia.)

In all of the studies the prevalence differed significantly between different age groups, i.e. it increases with age in both sexes (Table 3 & 4). This could be attributed to the

increase risk of exposure to the vector since the higher age group involved in activities such as fetching water from the rivers, gathering of woods and in different farming activities.

In a study done by Rahel L in Agaro goma farm majority of field workers were affected than the office workers. This indicates that the prevalence is higher in farmers.

The difference between the transmission period of the disease in Metema-Humera by Biru M et al and in Teppi by Asrat H et al <sup>(5,17)</sup> could be due to etiology differences of the areas.

The extent of Onchocerciasis in Ethiopia has its own unique features, it is described as mild in comparison to both the Sudan and West Africa. <sup>(20)</sup> Distinctions between “rain forest” and Sudan-Savanna forms of onchocerciasis, based on differences in clinical manifestations and differences in immunological findings, have been made by many authors <sup>(8)</sup>.

Variations in the clinical manifestations of onchocerciasis have been observed in studies conducted in different areas of the country.

A study done in Metema-Humera shown ‘Sudan-Savanna’ type of clinical features that is the absence of scrotal elephantiasis, adenolymphocele and rare nodules or onchocercomata <sup>(5)</sup>.

The other study done in Bebekka appear to be similar to “forest type”, endemic zones in West Africa. It had a higher prevalence of people with nodules, the clinical manifestations and parasitic burden of onchocerciasis <sup>(8)</sup>. This could be due to the ecology difference.

Hanging or pendular scrotum that has been rarely reported in Africa, was found in 19% of the male patients in a study done in Teppi, Southwest Ethiopia by Mengistu G et al <sup>(18)</sup>.

Asefa A et al., found fairly distribution of reactive skin lesions in all age groups where as the chronic lesions were commoner with increasing age. Itching was reported in most of the study population. Excoriation and dyspigmentations were commoner in males than in females <sup>(11)</sup>.

Macular dyspigmentation, enlarged inguinal and femoral lymphglands and scrotal elephantiasis was studied by A.P. Oomen <sup>(4)</sup>.

However ocular onchocerciasis that causes loss of vision and blindness was considered to be mild in Ethiopia <sup>(21)</sup> but some

of the studies has reported some complaints of reduced vision and blindness <sup>(11,19)</sup>.

This ocular onchocerciasis could be due to changing in the features of clinical manifestations of onchocerciasis in Ethiopia or due to non-onchocercal diseases.

This study clearly shows the existence and severity of onchocerciasis in many parts of Ethiopia mainly in the south western parts of the country affecting many proportions of the populations.

### **CONCLUSIONS**

Onchocerciasis was higher in males than females and more common in adults of middle age groups than other age groups.

The prevalence of the disease is associated with activities like farming, washing clothes near the river and swimming that expose individuals to the vector.

Ocular onchocerciasis considered as mild or rare in Ethiopia, but ocular manifestations has been reported in some of the studies.

### **RECOMMENDATIONS**

Ocular manifestations must be studied specifically in different regions of the Ethiopia.

A country wide study about onchocerciasis and economical impacts caused by the disease in Ethiopia should be implemented.

The government and other non-governmental organizations should have to work on increasing the awareness of the communities in endemic areas towards the disease and implementing desirable control and prevention mechanism.

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