

**BRIEF COMMUNICATION****Examination of Fingernail Contents and Stool for Ova, Cyst and Larva of Intestinal Parasites from Food Handlers Working in Student Cafeterias in three Higher Institutions in Jimma.****Zewdneh Sahlemariam, BSc<sup>1\*</sup>, Girma Mekete, BSc<sup>1</sup>****ABSTRACT**

**Background:** *A prerequisite for the most practical and economic control and prevention measures of intestinal parasites is to have a clear understanding of their mode of transmission and epidemiology. Food handlers with poor personal hygiene working in food serving establishments could be potential sources of infections by many of the intestinal helminths and protozoa. The objective of this study was to determine the level of fingernail contamination with stages of parasites as a contribution of the hand-to-mouth route in the transmission of intestinal parasites.*

**Methods:** *A cross-sectional survey of food-handlers working in student cafeteria in three higher educational institutions in Jimma town i.e., Jimma University (the former Jimma Institute of Health Sciences and Jimma College of Agriculture), and Jimma Teachers' Training College, was conducted to determine the level of finger nail contamination with ova, larvae and cysts of parasites and stool from November 1 to December 1, 1997. One hundred and one food-handlers working in the three cafeterias during the study period were included in the study. From the study subjects finger nail contents of both hands and stool specimens were examined by direct microscopic examination using normal saline and iodine solution.*

**Results:** *Out of the 101 finger nail content specimens, 11 (10.9%) were positive for one or more parasites. The parasites identified were Ascaris lumbricoides, Taenia species, Giardia lamblia and Entamoeba histolytica. Of the 101 of the stool specimens examined 59(58.4%) were positive for any one parasite and multiple infections were identified in 17.8% of the positive cases. A. lumbricoides 24(23.8%) was found to be the most prevalent parasite followed by Trichuris trichuria 17(16.8%), E. histolytica, 10 (9.9%), Hookworm species, 3 (2.9%), Taenia species, 3 (2.9%), and G. lamblia, 2 (1.9%). Further analysis showed that there was no statistically significance difference between the findings in the three institutions ( $P>0.05$ ).*

**Conclusion:** *Results from such studies may contribute in identifying the factors involved in the hand-to-mouth transmission of parasites and in breaking the chain of transmission by recommending the implementation of such simple preventive and control measures including proper personal hygiene, regular medical check up of food handlers, regular trimming of fingernails and health education.*

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**Key words:** *Food-handlers, Intestinal parasites, Finger nail, stool*

## INTRODUCTION

In tropical countries, parasitic diseases remain among the most ubiquitous and serious health problems with strikingly high prevalence rates of the major protozoan and helminthic infections (1,2).

Intestinal parasites have been widely distributed in Ethiopia, as in most of African countries and their epidemiology has been studied by several authors (1-4). According to MOH of Ethiopia (5), intestinal parasitism accounts for 8.5% of all male and 10.4% of all female out-patient visits in the country. Prevalence rates higher than 70% and high rates of multiple infections have been reported from many urban and rural communities (2,6-9).

The high prevalence of intestinal parasites is largely due to lack of personal and environmental sanitation, lack of safe water supply, human behaviour, poverty, ignorance of health promotion practices and impoverished health services (1-4). High prevalence of intestinal parasitic infections and polyparasitism affect the health status of the individual mainly affecting physical and mental developments causing malnutrition, anaemia, stunting, cognitive impairment, lowered educational achievement and interfering with productivity (10-12).

Transmission of intestinal parasites is effected directly or indirectly through faeces contaminated objects such as food, water, soil and finger. Although various modes of transmission of intestinal parasites are known to exist, several studies have shown the higher magnitude of hand to mouth transmission as potential sources of exposure to parasitic infections (3). Accordingly, food handlers with poor personal hygiene working in food serving-establishments could be potential sources of infections by many of the intestinal helminths and protozoa. On the other hand,

a prerequisite for the control and prevention of intestinal parasitosis is a clear understanding of the epidemiology of each causative organism. With this information at hand, the most practical and economic control and prevention measures could be undertaken.

Food-handlers who harbour and excrete intestinal parasites may contaminate food from their faeces-to-their fingers and then to food processing, and the healthy person may be infected by eating this finger-to-food contaminated food stuffs (13). The importance of handlers as threats in the transmissions of parasitic diseases has been stressed by several authors (13-15).

The aim of this study was to determine the level of fingernail contamination with stages of parasites as a contribution of the hand-to-mouth routes of transmissions of intestinal parasites.

## MATERIALS AND METHODS

Jimma town is located 335 kms Southwest of Addis Ababa. The total population of the town is estimated to be 95,475. The town Jimma has an annual temperature range of 11.5<sup>0</sup>C and a mean annual rainfall of 1749 mm (8). There are three higher institutions in Jimma, Jimma University (the former Jimma Institute of Health Sciences, JIHS, Jimma College of Agriculture (JCA), and Jimma Teachers' Training College (JTTC). There were a total of 2273 students (1300, 423 and 550) served at the student cafeteria of JIHS, JCA and JTC respectively. The number of food-handlers in the cafeterias were 70 (20males and 50 females), 28 (6 males and 22 females) and 23 (5males and 18 females) at JIHS, JCA and JTTC respectively.

A cross-sectional survey of food handlers working in student cafeterias of Jimma Institute of Health Sciences (JIHS), Jimma College of Agriculture (JCA) and

Jimma Teachers' Training College (JTTC) was conducted from November 1 to December 1, 1997.

Out of the total 121 food handlers in the 3 institutions, 57 were from JIHS, 27 from JTA and 17 from JTTC. Samples of fingernail contents were taken from both the right and left hands of each food-handlers' fingernail contents using an applicator stick specially prepared for this purpose, and also stool samples were collected from each of them. Samples of finger nail content and stool were examined for the presence of stages of intestinal parasites using direct wet mount preparations with normal saline and iodine solution. The food-handlers included in the study were those who did not take treatment or any intestinal ailment three months or less prior to the study. All the necessary information including age, sex, educational level, hygiene status and condition of fingernails were collected using a structured and pre-tested questionnaire.

## RESULTS

Out of the total 121 food-handlers in all the

institutes only 101 responded making an overall coverage of 83.5% (82%, 96% and 74% at JIHS, JCA and JTC, respectively). Majority of the respondents were in the age groups of 26-35 years old in the educational level of 1 to 6 grade ( Table 1).

From the 101 sampled finger nail dirt, 11(10.9%) were found to be positive for ova and cysts of intestinal parasites. Among these subjects, 5 of them harboured ova of *Ascaris lumbricoides*, other 5 had cysts of *Entamoeba histolytica* and 1 individual harboured ova of *Taenia* species (Data not shown).

Out of the 101 stool specimens examined. 59 (58.4%) were positive and showed a greater prevalence of intestinal parasites among food-handlers of JCA, 19 (70.4%), followed by JTTC, 11(64.7%). *A. lumbricoides* was found to be the most prevalent parasite followed by *Trichuris trichuria* and *E. histolytica* (Table 2).

Out of the 59 (58.4%) positive results, 17.8% of the study population harboured two or more intestinal parasites.

**Table1.** Socio-demographic characteristics of food handlers in student cafeteria of each of the three institutions, Jimma, 1997.

Variables	JIHS			JCA			JTTC		
	Male No	Fem. No	Total No (%)	Male No	Fem. No	Total No (%)	Male No	Fem. No	Total No (%)
Age									
15-25	5	6	11(19.3)	-	-	-	-	2	2(11.8)
16-35	5	21	26(45.6)	6	8	14(51.9)	-	10	10(58.8)
36-45	-	18	18(31.6)	-	13	13(48.1)	2	3	5(29.4)
>54	2	-	1(3.5)	-	-	-	-	-	-
Education level									
Illiterate	1	1		2(3.5)	1	4	5(18.5)	-	1(5.9)
RW	-	2	2(3.5)	1	1	2(7.4)	1	-	10(5.9)
1-6	4	24	28(49.1)	2	13	15(55.6)	1	9	10(58.8)
7-10	3	16	19(33.3)	1	1	2(7.4)	-	4	4(23.5)
11-12 grade	4	2	6(10.5)	1	2	3(11.1)	-	1	1(5.9)

RW: Read & write

**Table 2.** Result of stool examination of food handlers in student cafeterias of each of the three institutions, Jimma, 1997.

Parasite species isolated	JIHS (n=57) No (%)	TCA (n=27) No (%)	JTC (n=17) No (%)	Total (N=101) No (%)
<i>A. lumbricoides</i>	14 (24.6)	7 (25.9)	3 (17.6)	24 (23.8)
<i>T trichuria</i>	6 (10.5)	7 (25.9)	4 (23.5)	17(16.8)
<i>Hookworm</i>	1(1.8)	1 (3.7)	1(5.9)	3 (2.9)
<i>Taenia species</i>	2 (3.5)	-	1(5.9)	3 (2.9)
<i>E histolytica</i>	6 (10.5)	3 (11.1)	1(5.9)	19 (9.9)
<i>G. lamblia</i>	-	1 (3.7)	1(5.9)	2 (1.9)
Total	29 (50.9)	19 (70.4)	11(64.7)	59 (58.4)

## DISCUSSION

In this study 11 (10.9%) of the study subjects, their fingernails were contaminated with cysts and/or ova of parasites, the most common being *A. lumbricoides* followed by *E. histolytica* and *Taenia species*. Examination of stool specimens showed a greater prevalence of intestinal parasites in their faecal samples than their fingernail contents. The presence of cysts and ova of parasites in the

fingernail contents indicate contamination of the fingernail may be of importance as a potential sources transmission for intestinal parasites. Intestinal parasites are taken as indicators of poor sanitary conditions (3).

Absence and/or the low prevalence of other intestinal parasites might be due to the technique used in this study. Specific methods such as the adhesive scotch tape for *E. vermicularis*, Harada Moori's filter paper culture technique, Agar culture

technique and Bearmanns technique for *S. stercoralis* and for hookworm infections, Kato-thick smear for most intestinal helminths and formal-ether concentration techniques for most intestinal parasites are preferred methods. As a result, much greater rates of parasites would have been found if these methods in combination were used in this study.

In Ethiopia, no systematic study has been done on the transmission dynamics of intestinal parasites in different ecological zones. A review of the literature reveals very few investigations of fingernail contents were carried out. A similar study conducted on fingernail content by Okubagzhi (15) revealed that ova, larvae and cysts of intestinal parasites were isolated from 176 (30.9%) of the subjects. Another study by Britz *et al* (16) in 1965 stated that 3.3% of the population studied in Leipzig, Germany, carried *E. vermicularis* eggs under their fingernails.

Examination of stool specimen showed a greater prevalence of intestinal parasites among food-handlers of JCA (70.4%), followed by JTC (64.7%). The overall prevalence of intestinal parasites in stool in this study 58.4% which is comparable with other studies (16-21) but it is quite high when compared with the findings of Tsehai *et. al.* (43.6%) [19]. However, it is much less when compared with the findings of Assefa *et.al* (88.2%)[22] and Ibrhim *et al* (86.2%) [23]. This might be due to variations in the target groups.

Most studies indicated that the prevalence of *A. lumbricoides* was high and followed by *T. trichuria* (21,24, 25). This might be due to the similarities in their mode of transmission and life cycle. A study conducted by Tedla *et al* (4), out of 32,276 study subjects, 43.7% were infected with *A. lumbricoides*. According to the monthly reports of the Ministry of Health (5), 3.4% of all female and 2.6% of all male

outpatient visits in 1988-89 were for treatment of ascariasis.

Infections with the protozoan parasites like *Entamoeba histolytica* and *Giardia lamblia* are common causes of diarrhoea worldwide (10,26). These parasites easily contaminate the hands. Thus they are frequently isolated from the fingernails and stool specimens of food handlers.

In conclusion, infections with the pathogenic protozoa, *E. histolytica* and *G. lamblia* are common causes of diarrhoea. The finding of these parasites in the fingernail contents and stool specimens of the food-handlers may predict the source of infection by these parasites. Results from such studies would therefore contribute in identifying the factors involved in the hand-to-mouth transmission of parasites and in breaking the chain of transmission by recommending the implementation of simple practices such as strict personal hygiene, regular screening of food handlers for parasites, periodic deworming, health education on regular trimming or cleaning of fingernails and training of food handlers in basic principles of hygienic ways of food handling.

#### ACKNOWLEDGEMENT

This study was financially supported by the Research and Publications Office of Jimma University.

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