

## **The Prevalence of Hookworm Infection Among Patients Attending Sunni Private Clinic, Maiduguri, Nigeria**

A. Mohammed\*, A. A. Biu and A. D. Bukar

Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine,  
University of Maiduguri, P. M. B. 1069, Maiduguri, Nigeria

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### **ABSTRACT**

This study was conducted using the moist-filter paper-strip-faecal smear method for larval culture to determine the prevalence of hookworm infections among patients attending Sunni Private Clinic, Maiduguri. A total of 60 patients were examined out of which 27 (45.0%) were infected. Fifteen (55.6%) had *Necator americanus*, while 12(44.4%) had *Ancylostoma duodenale* ( $p>0.05$ ). Male patients were more infected (52.0%) compared to the females with (40.0%) ( $p>0.05$ ). Age groups of  $\leq 20$  years were significantly ( $p<0.05$ ) more infected (65.4%) compared to those of  $>20$  years with (29.4%). The mean  $\pm$  SD packed cell volume values (PCV %) for male and female patients were  $34.5 \pm 7.8$  and  $30.0 \pm 2.8$  respectively, while for the ages  $\leq 20$  and  $>20$  years were  $31.0 \pm 1.4$  and  $35.0 \pm 7.1$  respectively. These findings are discussed with reference to the improvement of sanitary conditions and health education programme of the metropolitan communities.

**Key words:** Hookworms, patients, Sunni Clinic, Maiduguri, Nigeria

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### **INTRODUCTION**

Anthropophilic hookworms of the species *Ancylostoma duodenale* and *Necator americanus* are known to infect humans worldwide. It is estimated that one billion or more people are chronically infected and the disease has been correlated with poverty, ignorance, poor personal and environmental hygiene and poor health care delivery services (Ogbe *et. al.*, 2002). These infections cause intestinal symptoms, coupled with other adverse effects, which may result in exsanguination and iron deficiency anaemia (Adeyeba and Akinlabi, 2002). Biu and Harry (2001), Biu and Adam (2004), and Biu and Rebecca (2004) reported on the prevalence of gastrointestinal parasites among patients in Maiduguri, but did not provide any on hookworms, hence the need for this study to provide baseline data on the disease with the aim of proffering control and preventive measures.

### **MATERIALS AND METHODS**

#### ***Study area***

Borno State lies within latitude  $11^{\circ} - 15^{\circ}$  E and longitude  $10^{\circ} - 25^{\circ}$  N with an area of about 69, 436 sq. km, an estimated population of 4.2 million, a population density of 68 inhabitants /square kilometer (National Population Commission, Nigeria, 2006). The rainy season lasts from June to September in the north which has a Sahelian vegetation and May to October in the South with Sudan vegetation (Musa and Pindar, 2005).

This study was conducted between November 2001 and November 2002 at Sunni Clinic, Abbaganaram Ward of the Maiduguri metropolitan council.

#### ***Patients consent and ethical consideration***

Before the commencement of this study, an approval was sought and obtained from the administrative authority of the clinic, and patients clearly informed on the objectives, design and merits of the study.

#### ***Specimen collection***

Stool containers labeled with personal data (sex and age) of each patient were distributed on each visit to the hospital. Blood samples were also collected from each patient into ethylene diamine tetra acetic acid (EDTA) coated

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\*Author for correspondence

universal bottles.

### ***Faecal culture and larval identification***

Smears of faecal samples from patients suspected of hookworm infection were made on moist filter paper strips confined specifically to the middle of the strip, so that the end remains clean (Harada-Mori test tube filter paper method). The paper strips were incubated at 28°C in test tubes containing small amounts of water. The hookworm filariform larvae developed within 5 - 7 days and were collected at the bottom of the tube using a sieve-mesh of 200 apertures to the linear inch size, killed in 5% formalin and examined under the stereoscopic microscope. They were identified and distinguished morphologically using the criteria of Muller (1975) and Ukoli (1990) by taking note of the structure of the oesophagus, and cuticle (sheath), shape of the head, size of the larvae and the length measured using microscopic calibration (Sloss *et al.*, 1994) and shape of the tail.

### ***PCV estimation***

Blood samples were assessed based on the sex and age of patients. Finger pricked blood samples were collected into properly labeled haematocrit capillary tubes, and centrifuged for 5 minutes at 800 g and the PCV read using a haematocrit reader. Anaemia was defined as PCV of less than 30% in this study (Nebe *et al.*, 2002)

### ***Statistical analysis:***

The students *t*-test was used to compare the mean PCV according to age and sex and Chi-square test to compare percentage infected by age and sex with *p*-values equal to or less than 0.05 regarded as significant (Dibal, 1991).

## **RESULTS**

An overall prevalence of 45% was recorded in this study with males being relatively more commonly infected (52.0%) than females (40.0%). Patients aged 20 years or below had significantly (*p*<0.05) higher prevalence (65.4%) than those above that age (29.4%).

The parasites recovered were *N. americanus* and *A. duodenale* and these occurred in 15 (55.6%) and 12 (44.6%) of the patients.

The mean  $\pm$  SD PCV recorded was  $32.7 \pm 8.5$ . Males had a mean  $\pm$  SD PCV of  $34.5 \pm 7.8$  while females had  $30.0 \pm 2.8$ . Among age groups, those aged 20 years and below had a mean  $\pm$  SD of  $31.0 \pm 1.4$  while those aged above 20 years had a mean  $\pm$  SD PCV of  $35.0 \pm 7.1$  (Table 1).

Table 2 shows the characterization of the filariforms identified in this study. The mean  $\pm$  SD length ( $\mu$ m) for *A. duodenale* was  $658 \pm 2.8$  and *Necator americanus*  $585 \pm 7.1$ .

**Table I.** Prevalence and age and sex –wise distribution of hookworms among the patients examined in relation to their packed cell volume (PCV%) values.

	No. of patients examined	No. (%) infected	Mean $\pm$ SD (PCV)
Total	60	27 (45.0)	$32.7 \pm 8.5$
<b><i>Parasite</i></b>			
<i>Necator americanus</i>	-	15 (55.6)	-
<i>Ancylostoma duodenale</i>	-	12 (44.4)	-
<b><i>Sex</i></b>			
Male	25	13 (52.0)	$34.5 \pm 7.8$
Female	35	14 (40.0)	$30.0 \pm 2.8$
<b><i>Age</i></b>			
$\leq 20$ yrs	26	17 (65.4)	$31.0 \pm 1.4$
$> 20$ yrs	34	10 (29.4)	$35.0 \pm 7.1$

## **DISCUSSION**

The results of this study have revealed that hookworm infection by *N. americanus* and *A. duodenale* is common in Maiduguri. Epidemiology of these infections has been reported to be influenced by low standards of hygiene and

the existence of favourable environmental conditions for the development and survival of their larvae (Beaver and Morrison 1984, Ogbe *et al.*, 2002). Also *Musca domestica*, the common housefly has been suspected to transmit various worm eggs in its faeces and its external surfaces (Oyerinde, 1976), and these flies are abundant in Maiduguri (Biu and Nwosu, 1999).

**Table 2** Characterization of the filariform larvae of the hookworms identified in this study

Characteristic	Mean $\pm$ SD ( $\mu$ m)	
	<i>Ancylostoma duodenale</i>	<i>Necator americanus</i>
Length	658 $\pm$ 2.8	585 $\pm$ 7.1
Sheath	Striations not clear	Striations clear at tail end
Tail	Blunt	Sharply pointed
Head	Blunt	Rounded

The finding of a higher prevalence of infection in the younger age group ( $\leq 20$  years) compared to the older population ( $> 20$  years) in the study corroborates previous reports (Ukoli, 1990; Adeyeba and Akinlabi, 2002; Ogbe *et al.*, 2002) that worm burden decrease with adulthood. Since there was no evidence of a change in the rate of exposure, it is likely that host immune response limits the hookworm population of patients. Sex associated effects in this study could be attributed to differences in exposure to infection, with the females less infected than males (Ukoli, 1990).

In conclusion, patients who had hookworm in this study were given a prescription of pyrantel pamoate (combantrim®) antihelminthic, and educated on how safe disposal of excreta is of fundamental importance in the control of hookworm in addition to regular deworming and improved nutritional status (especially with respect to iron content) of the populace.

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