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Original Article

# HOOKWORM INFECTION AMONG HUMANS IN PANDA, PANDA DEVELOPMENT AREA, KARU LGA OF NASARAWA STATE, NIGERIA

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## ABSTRACT

Comparative studies on the prevalence rate of hookworm infection in Panda, Panda Development Area, Karu Local Government Area, Nasarawa State, Nigeria was carried out between the months of April to July, 2011. The procedure involved collecting and processing of stool samples in accordance with standard parasitological techniques. Out of 288 samples collected, 114 (39.58%) were positive for hookworm infection with a peak in those subjects in the age group 0 – 10 years (50.66%), followed by 21–30 years (41.17%) and then 61 – 70 years had the least infection rate of 4 (28.57%). This study showed that the prevalence of infection was higher among males (42.94%) compared to females (35.60%), and significant difference exists in the rate of infection between the two sexes ($P < 0.05$). There was more infection of Hookworm among farmers (55.88%) than civil servants; and the latter had the least infection rate of (28.57%). The above prevalence rate of infection could become higher in years to come and therefore become more threatening due to increase in birth rate and other socio-economic factors.

**Keywords:** Hookworm, Infection, Panda, Parasitological, Prevalence.

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## INTRODUCTION

Hookworm is a parasitic nematode that lives in the small intestine of its host, which may be a mammal such as dog, cat or human (Hotez *et al.,* 2004; Markell *et al*., 2006). Two species of hookworm commonly infect humans, *Ancylostoma dueodenale* and *Necator americanus*. Hookworms are thought to infect more than 600 million people world wide. Both *A. duodenalis* and *N. americanus* are found in Africa, Asia and America (Chu *et al.,* 2004; Markell *et al*., 2006). Infection by hookworm is the second most common human helminth infection after ascariasis. In contrast to most intestinal helminthiasis, where the heaviest parasitic loads tend to occur in children, hookworm prevalence and intensity can be higher among adult males. Indeed, in most endemic areas, Hotez *et al*. (2004 and 2005) reported that adult women are the most severely affected by anaemia, mainly due to their much higher need for iron as a result of menstruation and repeated pregnancy in addition to the fact that customarily they are constraine to much poorer food than men. Hotez *et al*. (2004; 2005) added that majority of the infected individuals live in poverty striken areas with poor sanitation. Although, this infection is rarely fatal, but anaemia can be significant in heavily infected individuals, thus Gyorkos *et al*. (2006) reported that 56% of all pregnant women in developing countries are suffering from anaemia out of which 20% of all maternal deaths are either directly or indirectly related to anaemia. The infection of the host is caused by the larvae and not the eggs, caused by walking (bare footed) through areas contaminated with faecal matter (Hawdon and Hotez, 1996; Ndenecho *et al*., 2002; De-Silva *et al*., 2003).

In Nigeria, a considerable amount of human and animal wastes are discharge into the soil daily leading to the seeding of the soil with pathogenic organisms including Geo-helminth eggs and larvae (Okon *et al*., 2002; Ogbe *et al*., 2002). Infection may be direct or indirect through secondary sources as food, water, vegetables and fruits since most hookworm infections are acquired through the faecal-oral route. Observations in Zaria, Northern Nigeria showed that 70% of the soil samples collected in a school compound was contaminated with hookworm eggs showing the level to which the soil can be contaminated with faeces (Glickman *et al.,* 1999; Nock *et al.,* 2003). This kind of infection has been recognised as one of the leading causes of child morbidity in the developing countries of the Tropics and sub-tropics. Hence, in susceptible children this infection affects their intellectual cognitive and causes growth retardation; intra-uterine growth retardation (IUGR), prematurity and low birth weight (LBW) among new born in infected mothers are also associated with infection (Dada-Adegbola *et al*., 2005; Markell *et al*., 2006). Since determining prevalence rate of a disease is an

important information that can be used in sensitizing Government and other stakeholders interested in disease prevention and control, towards taking timely appropriate measures, this study was conducted with the view to determining the prevalence of hookworm infection among the inhabitant of Panda community, by screening them for the presence of eggs and/or larvae/adult of the hookworms through microscopic and macroscopic stool sample analysis, respectively.

## MATERIALS AND METHODS

### Study Area

The study area was Panda, Panda Development Area, Karu Local Government Area, Nasarawa State, Nigeria. The predominant people in the study area are peasant farmers; some are civil servants, while others are business men and women. Nasarawa State lies between latitude $7^0$.45' N and $9^0$.25'N of the equatyor and between longitude $7^0$ and $9^0$ 37' E of the equator. According to National Population Commission (2006), the population of Nasarawa state during the 2006 National Population Census was 18,632,75. Nasarawa is within the savannah region of Nigeria, with rainy season usually from May to October and the cold dry season is within the months of November to April.

### Sample Collection

A total of two hundred and eighty eight (288) stool samples were collected and analysed from people on the basis of clinical information written on the patients' Laboratory Request Form. All samples were collected between the months of April and July, 2011. Questionnaires were administered alongside the sample collection. With permission from the Village/community heads, about 20 – 40 grams of well formed stool or 4 – 5 table spoonful of watery stool were collected for a routine laboratory examination. Fresh stool sample for hookworm screening was collected from each of the patients in a dry, clean, leak proof and sterilized sample container, while making sure that no urine, water, soil or other contaminants get into the container. All specimens were properly labelled with individual's names, sex, age, location, and the date of collection. The fresh stool samples were processed and examined microscopically (Oyerinde, 1999; Cheesbrough, 2000; 2005).

### Parasitological Analysis

The faecal samples were processed and examined for the presence of hookworm eggs. Microscopic examination of the stool samples was done by direct saline preparation for ova and cysts (Cheesbrough, 2005). On a microscope slide, emulsified small stool specimen was added on to a normal saline (Sodium chloride 0.9 w/v) and on one edge of the side cover slip was carefully placed on the suspensions avoiding over floating and air bubbles. The samples were microscopically examined, identified and confirmed using x10 and x40

objective lenses respectively (Cheesbrough, 2005).

### Statistical Analysis

The data generated were analysed for significant difference between the rate of hookworm infection recorded between males and females tested during the study using Chi-square test.

## RESULTS

Table 1 showed the summary of the results obtained during this study. The result indicated that out of 288 patients examined, 114 (39.58%) were infected by the hookworm, with 67 (42.94%) in males compared to 47 (35.60%) in females and there was a significant difference in the rate of infection between the two sexes ($P< 0.05$). Individuals in the age group 0 – 10 years had the highest infection rate of 38 (50.66) while individual in the age group 61 – 70 had the least infection rate of 4 (28.57).

Male had the highest infection rate of 67 (42.94) compared to the female 47 (35.60) ($P< 0.05$).

In Table 3, it is shown that individuals who are farmers by occupation had the highest infection rate of 38 (55.88), while those who are civil servants had the least infection rate of 12 (28.57).

Table 1: Prevalence of Hookworm infection in relation to age groups of Humans in Panda, Panda Development Area, Karu LGA of Nasarawa State, Nigeria.

| Age (Yrs) | No. Examined | No. Infected | Infection (%) |
|---|---|---|---|
| 0 – 10 | 75 | 38 | 50.67 |
| 11 – 20 | 68 | 28 | 41.18 |
| 21 – 30 | 53 | 17 | 32.08 |
| 31 – 40 | 32 | 11 | 34.38 |
| 41 – 50 | 27 | 09 | 33.33 |
| 51 – 60 | 19 | 07 | 36.84 |
| 61 – 70 | 14 | 04 | 28.57 |
| Total | 288 | 114 | 39.58 |

Table 2: Prevalence of Hookworm infection by Sex in Humans in Panda, Panda Development Area, Karu LGA of Nasarawa State, Nigeria.

| Sex | No. Examined | No. Infected | Infected (%) |
|---|---|---|---|
| Male | 156 | 67 | 42.95 |
| Female | 132 | 47 | 35.61 |
| Total | 288 | 114 | 39.58 |

Table 3: Distribution of Hookworm infection based on occupation of Humans in Panda, Panda Development Area, Karu LGA of Nasarawa State, Nigeria.

| Occupation | No. Examined | No. infected (%) |
|---|---|---|
| Civil Servants | 42 | 12 (28.57) |
| Business Men/Women | 27 | 9 (33.33) |
| Cattle Rearers | 23 | 10 (43.48) |
| Fishermen | 56 | 17 (30.36) |
| Students | 72 | 28 (38.89) |
| Farmers | 68 | 38 (55.88) |
| Total | 288 | 114 (39.58) |

## DISCUSSION

Comparing this prevalence rate with what was obtained in similar studies else where such as Darjeeling, India with 42.8% (Pal *et al.*, 2007), Hoabinh, North western Vietnam with 52% prevalence out of 526 tested households (Verle *et al.*, 2003), Xiulongkan village, China with 60% infection rate (Gandhi *et al.*, 2001) and Minas Gerais, Brazil with 62.8% as reported by Fleming *et al.* (2006), one can say that the prevalence rate of 39.58% found in this study is relatively the same and relatively high compared to the study conducted in Aminu Kano Teaching Hospital by Ibrahim and Zubairu, (2010). The result of this study demostrate a high prevalence rate of 39.58% compared to the 9.5% recorded by Chukwuma *et al.* (2009) in Ebenebe Town, Anambra State, Nigeria. This can be attributed to the fact that the hospital is city–based, where a significant number of those patronizing are villagers and are ignorant without better awareness compared to those in the cities; although some of the cases could be referral type from other hospitals. It should, however, be noted that the above prevalence rate could be different if the study was extended to cover rainy season.

The higher prevalence found among the males could be due to the fact that they are normally involved more in activities such as farming, playing football, cleaning of surroundings and water fetching in which they work barefooted, thus possibly stepping on areas contaminated with faecal matter containing the larvae (Hawdon and Hotez, 1996; Adeyeba and Essiet, 2001). Similarly, the higher prevalence rate of 50.66% recorded among patients between 0 – 10 years could probably be due to their higher involvement with soil eating and playing and therefore they became more at risk of infection by the disease. Moreover, the least infection rate of 4 (28.57) recorded among patients of 61 and above years could be attributed to their old age and hence their non-participatory manner on the above risk factors that normally expose individuals to the hookworm infection.

## CONCLUSION AND RECOMMENDATIONS

The above prevalence rate of infection is relatively high but could be more threatening in the future if not tackled or checked on time due to increase in birth rate and continued deterioration in other socio-economic factors, such as lack of quality food that is sometimes associated with poverty, which is common among most Nigerians and especially when walking in poor hygienic environment bare footed. Consequently, it was suggested that laying emphasis on personal and community hygiene can be achieved through promoting health education in addition to early diagnosis and treatment of the infection, will go a long way in checking the spread of this infection in the affected community.

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