

Original Research Article

**Prevalence of Intestinal Parasitic Helminths
from Fingernails of “*Almajiris*” in Birnin Kudu
Local Government Area, Jigawa State, Nigeria**

ABSTRACT

Aims: This study aimed to investigate the prevalence of intestinal parasitic helminth eggs in the fingernails of “*Almajiris*” in Birnin Kudu Local Government Area in Jigawa State, Nigeria and to determine the source of the infection as an indicator of the overall hygienic standard of “*Almajiris*” from such areas.

Study design: Cross-sectional Survey.

Place and Duration of Study: The study area was Birnin Kudu Local Government Area in Jigawa State, Nigeria. However, the research was conducted in the Faculty of Science and Science Education, Department of Biology, Kano University of Science and Technology, Wudil, Nigeria between January 2014 and April 2014.

Methodology: The study was conducted among Qur’anic school pupils (*Almajiris*) attending three different Qur’anic schools in Birnin Kudu, Jigawa state. Simple random sampling technique was employed in selecting the 383 “*Almajiris*” (age ranges from 7 years to 30 years) recruited for this study. Swab samples from the fingernails were subjected to Salt Flootation Technique and the nail clippings were analyzed using concentration method and eggs of parasites were identified by characteristic egg morphology using standard procedures.

Results: The prevalence of intestinal parasitic helminthes among the overall population studied was 54.8% (210 of 383). The parasites isolated from the fingernails of the *Almajiris* are: 29.5% *Ascaris lumbricoides*, 24.3% Hookworm, 19.0% *Enterobius vermicularis*, 8.1% *Trichuris trichuria* as well as mixed infections involving *Ascaris lumbricoides* and Hookworm, 6.7%; Hookworm and *T. trichuira*, 5.7%; *Ascaris lumbricoides* and *Enterobius vermicularis*, 4.2% and that between *Ascaris lumbricoides*, *Enterobius vermicularis* and *Trichuris trichuria*, 2.3%. The difference between the intestinal helminths was not significant ($P>0.05$). There were significant variation in relation to the infection among the three *qur’anic* schools ($P<0.05$). Age group between 11-15 years had the highest infection of 60.2% but this was not significant ($P>0.05$).

Conclusion: The study revealed high prevalence of intestinal helminth parasites in the fingernails of “*Almajiris*” and if not controlled, it may cause colossal health challenges to the community. This underscores the importance of teaching hand washing and personal hygiene to “*Almajiris*” and their teachers, otherwise known as “*Malams*” as well as inculcating the habit of periodic deworming exercise.

Keywords: *Almajiris*; Birnin Kudu; Fingernails; Intestinal helminthes; *Malams*; Qur’anic.

1. INTRODUCTION

Intestinal parasitic infections have become a global public health burden and this burden is even higher among children in developing countries. The consequences of intestinal

parasitic infections among children includes; stunted growth, iron deficiency anaemia, reduced haemoglobin, malaise, reduced physical activity, Vitamin A deficiency, impaired cognitive functions and learning ability [1, 2]. Some 3.5 billion people are infected and 450 million become ill as a result of intestinal parasitic infections [3]. From 1998 to 2002, an average of 1,329 food borne disease outbreaks were reported to the Center for Disease Control and Prevention (CDC) each year [4].

Intestinal parasitic infections caused by soil-transmitted helminthes are pernicious and are among the ten most common infections in the world [5]. The World Health Organization (WHO) estimated that 270 million pre-school and over 600 million school children in developing countries are living in areas where the parasites are extensively transmitted and are therefore in need of treatment and prevention interventions [6].

Intestinal parasites have a cosmopolitan distribution. However, their endemicity depends on factors such as socio-demographic variables associated with poverty such as reduced access to adequate sanitation, potable water and healthcare as well as the prevailing climatic and environmental conditions [7, 8, 9]. Local customs such as the use of human and animal fertilizers are also contributing factors.

Intestinal parasites adhere to fingers, fruits, vegetables, instruments, door handles and money [10]. They can also be transmitted by flies [5]. However, their adherences to fingernails are salient sources of infection [11]. Hence, the presence of intestinal parasites in the fingernails is an indication of one of the routes of transmission of the parasite; it is a pointer to the presence of an active infection or a source of parasitic infection. It is also an indication of poor personal hygiene associated with children from rural areas. Such children present a potent source of transmission to the larger community through sharing of common equipments in school, playing with one another and outright autoinoculation by means of finger biting and sucking, common among children of such age.

In developing countries particularly, intestinal parasites have been known to cause significant morbidity and mortality. The fecal-oral route is significant in the transmission of parasitic infections to humans through poor personal hygiene. When the soil becomes contaminated, the eggs in the soil can be transferred onto vegetables, door handles etc and then onto the hands from where it is transferred to the mouth [12, 13]. However, the role of intestinal helminths parasite in causing morbidity and as well as in the pathogenesis of other infectious diseases differs from species to species. Similarly, the distribution and prevalence of various species also differs from one region to another because of several environmental, social and geographical factors.

This study aimed to investigate the prevalence of intestinal parasite eggs in the fingernails of ^a“*Almajiris*” in Birnin Kudu Local Government Area in Jigawa State, Nigeria and determine the source of the infection as an indicator of the overall hygienic standard of “*Almajiris*” from such areas.

Footnote: ^a*The word “*Almajiri*” emanated from Arabic word *Almuhajir*, meaning “immigrant”. The name was given to Qur’anic pupils, in most of the present day Northern Nigeria, for they left their home towns usually to other places or to a popular teacher to obtain sound Qur’anic education. *Almajiri* is a general name given to both student and destitute but with different meaning to each. Whereas *Almajiri* (student) is meant generally for Qur’anic student, *Almajiri* (destitute) is simply a beggar (whether child or adult). *Almajiri* (student) too, begs for alms and food, but only at a specified time, that is after school break or on school-free days, unlike *Almajiri* (beggar) who only stops begging when he falls asleep.

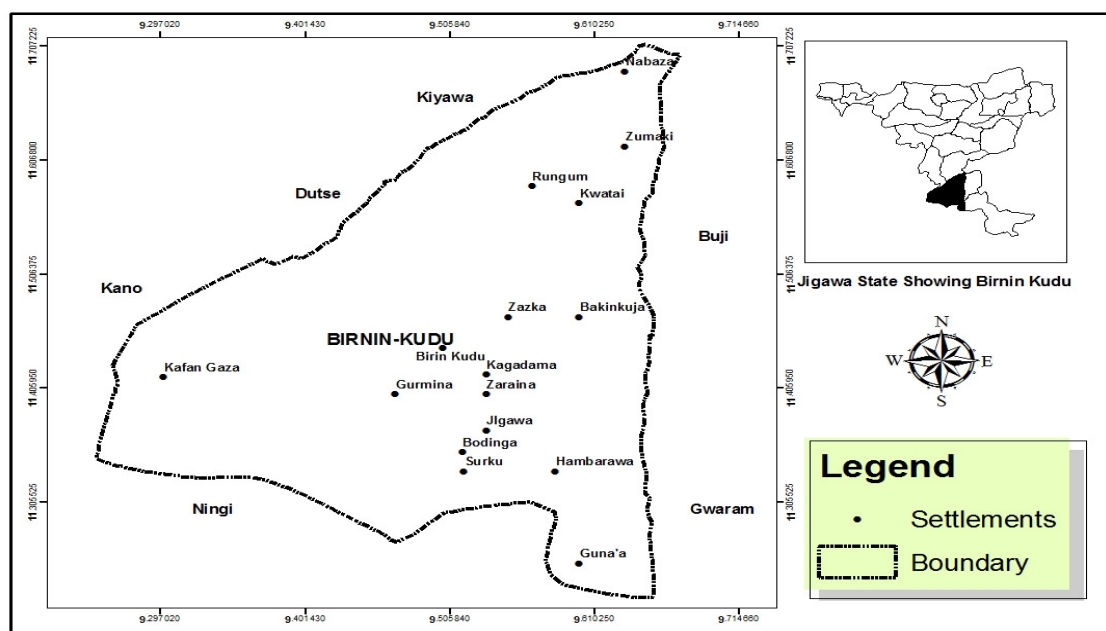
2. MATERIALS AND METHODS

2.1 The study area

Birnin Kudu is a Small town and a Local Government Area in the south of Jigawa State, Nigeria. The Local Government Area is located 41Km from the state capital and some 120Km south-east of Kano [14]. It is situated at 11.45° North latitude, 9.5° East longitude and 474m elevation above the sea level [15]; and has an estimated population of 313,373 [16]. The climate is semi arid, characterized by a long dry season and a short wet season. The climatic variables vary considerably over the year and are erratic. The temperature out regime is warm to hot. The mean annual temperature is about 25°C but the mean monthly values ranges between 21 °C in the coolest month and 31 °C in the hottest month.

Wet season is roughly four months (June to September) and dry season is seven to eight months (October to May). The rainy season may of start in May but early rains in April are not unusual. The bulk of the rainfall comes in June through September. Violent dust storms followed by tornado and lightening, usually herald the onset of the in rains in May/June and their retreat in September or early October [17].

Most of the state falls within the in Sudan Savannah vegetation belt, but traces of Guinea savannah vegetation are found in parts of the southern districts. Extensive open grasslands, with few scattered stunted trees, are characteristics of the vegetation. The major occupation of the inhabitants is farming, Cattle rearing and fishing.



Source: Department of Geography BUK (2014)

Fig 1. The Study Area.

2.2 Study Population

The study was conducted among Qur'anic school pupils (*Almajiris*) attending three different Qur'anic schools in Birnin Kudu, Jigawa state. Simple random sampling technique was employed in selecting the "*Almajiris*" recruited for this study. Three Qur'anic schools were studied and were labeled as A, B, C. The numbers of "*Almajiris*" from each of the schools are 135, 127 and 121 respectively. A total of 383 "*Almajiris*" were enlisted for this study. The age of the participants ranges from 7 years to 30 years.

2.3 Sample Collection

Swab samples were obtained from the fingernails of the "*Almajiris*". The nails were swabbed into a clean sterile container containing normal saline. Finger nail clippings were collected from both hands of each subject using sterile nail clippers and placed in labeled containers containing normal saline.

2.4 Laboratory Analysis

A drop of the mixture of the swabbed sample with normal saline was transferred, using a sterile plastic Pasteur pipette to the centre of cleaned grease free slide and carefully covered with a clean cover slip, avoiding air bubbles and over floatation. Direct microscopic examination of the samples for ova of helminthes was carried out using X10 and X40 objectives respectively.

The nail clippings were immersed in 10% Potassium hydroxide solution for 24 hours and subsequently centrifuged for 5 minutes at 2500rpm. The supernatant was discarded while the sediment of each specimen was stained with Lugol's Iodine and Eosin and subsequently examined under microscope using X10 and X40 objectives respectively. Eggs of parasites were identified by characteristic egg morphology using standard procedures [18].

2.5 Statistical Analysis

The prevalence of parasites was presented as descriptive statistics while the relationship between several variables and the presence of parasites was determined by the Chi square test. $P < 0.05$ was considered significant at 95% confidence interval. Data analysis was performed with the aid of Statistical Programme for Social Sciences (SPSS) version 18.0.

3. RESULTS

The prevalence of intestinal parasites among the overall population studied was 54.8% (210 of 383). The parasites isolated from the fingernails of the qur'anic school pupils are; *Ascaris lumbricoides*, Hookworm, *Enterobius vermicularis* and *Trichuris trichiura*, with prevalence rates of 29.5%, 24.3%, 19.0% and 8.1% respectively. There was also mixed infections involving *Ascaris lumbricoides* and Hookworm, 6.7%; Hookworm and *T. trichiura*, 5.7%; *Ascaris lumbricoides* and *Enterobius vermicularis*, 4.2% and that between *Ascaris lumbricoides*, *Enterobius vermicularis* and *Trichuris trichuria*, 2.3% (Table 1). However, there was no significant difference between the prevalence of various intestinal helminthes ($P > 0.05$). The prevalence of intestinal parasitic helminthes among the qur'anic schools studied is presented in Table 2. The results indicated that qur'anic school "A" had the highest overall intestinal parasitic helminthes infection of 61.5% as well as highest overall prevalence of *Ascaris lumbricoides* of 56.9% ($P < 0.05$) while qur'anic school "C" had the least

125 overall prevalence of intestinal parasitic helminth infections as well as *Ascaris lumbricoides*
 126 infections of 48.8% and 12.5% respectively.
 127 The age-related distribution of intestinal helminthes infections among the “*Almajiris*” in Birnin
 128 Kudu Local Government Area, Jigawa State is depicted in fig 2. The result showed that
 129 intestinal parasitic helminthes infection was at its peak (60.2%) within the age group of 11-15
 130 years; whereas the age group of 26-30 years had the least (31.8%) and there was no
 131 significant difference between the prevalence of the infection in relation to age groups
 132 among pupils ($P>0.05$) .
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135 **Table 1. Prevalence of Intestinal Helminthes among Almajiris in three Qur’anic**
 136 **Schools in Birnin Kudu Local Government Area, Jigawa State, Nigeria.**
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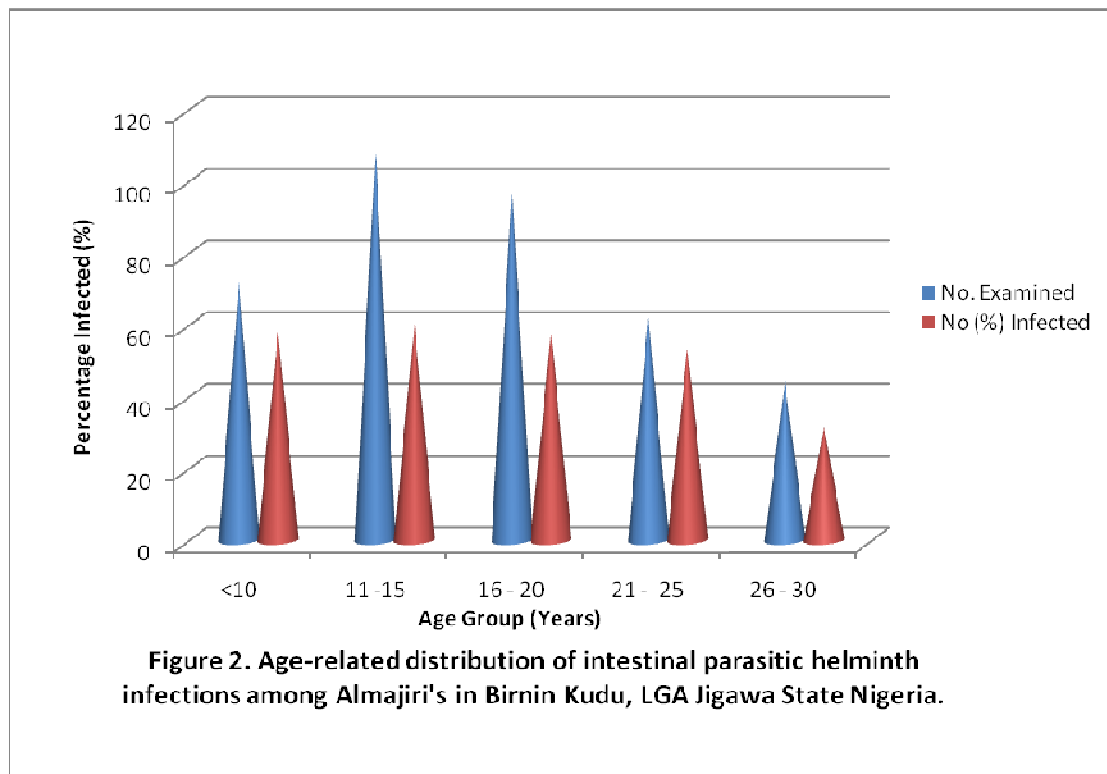
Parasite	No (%) Detected
<i>A. lumbricoides</i>	62 (29.5)
Hookworm	51 (24.3)
<i>E. vermicularis</i>	40 (19.0)
<i>Trichuris trichiura</i>	17 (8.1)
<i>A. lumbricoides</i> +Hookworm	14 (6.7)
<i>A. lumbricoides</i> + <i>E. vermicularis</i>	9 (4.2)
Hookworm+ <i>T. trichiura</i>	12 (5.7)
<i>A. lumbricoides</i> + <i>E. vermicularis</i> + <i>T. trichiura</i>	5 (2.3)
Total	210 (100)

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 139 *N= 383*
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147 **Table 2: Distribution of Intestinal Parasitic Helminthes among “*Almajiris*” in three**
 148 **Qur’anic Schools in Birnin Kudu Local Government Area, Jigawa State,**
 149 **Nigeria.**
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Qur'anic School	No. Examined	No. infected (%)	<i>A. lumbricoides</i> No. (%)	Hookworm No. (%)	<i>E. vermicularis</i> No. (%)	<i>T. trichuira</i> No. (%)
A	135	83 (61.5)	41 (56.9)	28 (45.9)	21 (42.0)	13 (48.1)
B	127	68 (53.5)	22 (30.6)	11 (18.0)	16 (32.0)	5 (18.5)
C	121	59 (48.8)	9 (12.5)	22 (36.1)	13 (26.0)	9 (33.3)
Total	383	210 (54.8)	72 (18.7)	61 (15.9)	50 (13.1)	27 (7.0)

151



152 Discussion

153 Helminth infections represent a major public health problem in poor and developing
 154 countries and have constituted a universal burden which does not only depend on regional
 155 or ecological conditions, but also on the development of the people [19]. The control and
 156 prevention of intestinal infections, either by parasites or bacteria, requires the understanding
 157 of the epidemiological aspects of the problem, for guidance in the design of practical and
 158 economic control and prevention measures. High prevalence of intestinal parasites is largely
 159 due to poor personal hygiene and environmental sanitation, lack of potable water, poverty,
 160 ignorance of health promotion practices and impoverished health services [20].
 161 Most common intestinal parasitic infections of man are fecal borne infections and the
 162 transmission occurs either directly from hand to mouth or indirectly through food and water.
 163 The transmission of these parasites within the community is directly related to human habits
 164 with regards to personal hygiene, feeding habits, defecation, cleanliness and level of
 165 education. Therefore, their prevalence in the community can be used as an indicator of the
 166 living conditions and environmental sanitation levels, as well as the socioeconomic status of
 167 the community [20].
 168 The present study revealed a high prevalence of intestinal helminth parasites (54.8%) and
 169 this is the first report of its kind in this study area. The result of this research is similar to
 170 those of [21]; [22]; [23]; [24]; [25]; [26] among others, as well as some parts of other
 171 countries such as Central Jakarta [20], where the there was high prevalence of intestinal
 172 helminth parasites amongst school pupils in other part of the country. It is however in
 173 contrast to a lower prevalence of 21% found among school children in Baglung, Nepal [27].
 174 The higher prevalence of *Ascaris lumbricoides* recorded in this study is in concordance with
 175 previous reports of [8]; [28]; [29]; [30]; [31] and [26]. This could be attributed to its high
 176 survival strategies which are conferred on it by the outer chitinous layer of the egg shell and
 177 the laying of numerous eggs of about 2000 per day by the female worm. Moreover, it was
 178 observed that the study area lacked environmental and personal hygiene as well as absence
 179 of modern toilet facilities. Hence, this might have tremendously contributed to the high
 180 prevalence rate of intestinal helminthes recorded in the area. It has been reported that lack
 181 of sanitary facilities, particularly latrine, would greatly determine the presence of roundworm
 182 in any given place [32]. In addition, it is a known fact that most "*Almajiris*" are in the habit of
 183 defaecating in the surrounding bushes and mostly walking bare footed; hence brightening
 184 the chances of contamination and infestation. Similarly, they are fond of picking up food
 185 items from the ground where they are prone to be infested by soil transmitted helminthes.
 186 The variations in the prevalence of the infection in different qur'anic schools studied could be
 187 associated with various factors involving the "*Almajiris*" themselves as well as the schools
 188 and its environment. It is a clear fact that the qur'anic schools studied, lack modern toilet
 189 facilities and even where the toilets are available; they appeared to be unclean and
 190 dilapidated as well as improper waste management system. Consequently, this necessitated
 191 indiscriminate defaecation in adjacent bushes; thereby colossally contributing to the
 192 prevalence of intestinal helminthes infection in the study area. Importantly, environmental
 193 sanitation plays a pivotal role in the transmission of most intestinal parasites.
 194 Though not significant, the proliferation and high rate of intestinal parasitic helminthes
 195 infection observed within the age group 11-15 years could be attributable to the active nature
 196 of the age range. In fact, children of this age bracket tend to be more exposed to
 197 contaminated sites and eating food with unwashed hands whereas the older age group tend
 198 to be more selective in their choice of food and outdoor activities thereby reducing infection
 199 risks through good health habits.

The relatively high prevalence rate of intestinal parasites observed in the present study is a reflection of poor personal hygiene. It is well-known that hand-to-mouth transmission is a potent route of transmission for most intestinal parasites. Therefore, the relatively high prevalence of helminth infestation indicates a lower level of education on personal and hand hygiene. It was also observed that the parasite eggs were markedly lower among “*Almajiris*” with trimmed fingers.

Despite their high prevalence in developing countries, persons with intestinal parasites have very low morbidity and mortality rates, thus intestinal parasites are commonly viewed as low-priority health problems. However, ascariasis caused intestinal obstruction in 5-35% of pediatric cases in a comparison of studies conducted throughout the tropics. The intestinal obstruction by *Ascaris* worms is often fatal. In addition, hookworm infection can cause iron deficiency anemia; and trichuriasis is associated with chronic dysentery and rectal prolapsed [33, 34].

This study underscores the importance of teaching hand washing and personal hygiene to “*Almajiris*” and their teachers, otherwise known as “*Malams*” as well as inculcating the habit of periodic deworming exercise. The provision of potable water and efficient waste disposal facilities to schools in most developing countries, especially those in rural areas, where there are almost no existing ones, cannot be overemphasized. This factor will drastically curtail as well as limit the rate of transmission of these parasites to other children, and also prevent autoinfection.

4. CONCLUSION

The study revealed high prevalence of intestinal helminth parasites in the fingernails of “*Almajiris*” and if not controlled, it may cause colossal health challenges to the community. Therefore, effective means of preventing the transmission of this parasites includes; provision of good toilet facilities and waste management system, integration of deworming programme into the existing health infrastructure, prompt treatment of infected persons and proper education on good personal hygiene and hand washing skills.

CONSENT

Informed consent was obtained from the Heads/Malams of the schools studied as well as the “*Almajiris*”.

ETHICAL APPROVAL

Approval for the study was granted by the Birnin Kudu Local Government Area Education Secretary.

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