

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 ($P\text{-value}=1.00$). There were significant variation in relation to the infection among the three *qur’anic* schools ($P\text{-value}=.001$). Age group between 11-15 years had the highest infection of 60.2% but this was not significant ($P\text{-value}=1.00$).

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

Infections with intestinal parasites are becoming pandemic thus presenting monumental public health consequences; hence, the call for global health concern. This menace has

become more prevalent and exacerbating among children in the third world nations. Some of the striking consequences of intestinal parasitic infections among children in developing nations include: Vitamin A deficiency, malaise, haemoglobin dysfunction, poor growth, iron deficiency anaemia, retarded physical activity and impaired mental functions [1, 2]. The rate of mortality as a result of infections with intestinal parasites has risen to 3.5 billion people whereas the morbidity rate stands at 450 million people [3]. From 1998 to 2002 only, a startling average of 1,329 food-borne epidemics was reported to the Center for Disease Control and Prevention (CDC) each year [4]. Soil-transmitted intestinal parasitic helminthes are lethal and are among the ten most prevalent infections in on the globe [5]. It has been estimated by the World Health Organization (WHO) that about 270 million pre-school and aout 600 million school children in the third world countries live in areas where the helminth parasites are endemic and are easily transmitted. Thus, such areas are in dare need of treatment and preventive interventions [6]. Moreover, intestinal parasites have a cosmopolitan preponderance. However, their endemicity depends on parameters like socio-demographic factors, poverty, reduced access to adequate sanitation, lack of potable water, illiteracy, local customs such as the use of human and animal fertilizers, lack of access to modern healthcare facilities, and prevailing climatic as well as environmental conditions [7-9]. Local customs such as the use of human and animal fertilizers are also contributing factors.

Intestinal parasites adhere to fingers, fruits, vegetables, work instruments, door handles and money exchange [10]. Also, these helminth parasites can be transmitted by vectors like flies [5]. However, their adherence to fingernails is a latent source of infection [11]. Thus, the presence of intestinal parasites in fingernails is an indication of one of the major routes of transmission of the parasites. Indeed, it is a clear indication to the presence of an active infection or a source of parasitic infections. Obviously, it is an unarguable sign of poor personal hygiene, which is usually associated with children from rural areas. Consequently, these children portend a vibrant source of transmission to the entire community through sharing of common equipment in school, playing with one another and autoinoculation by means of finger biting and sucking, which is common among children of a peer age group. In developing countries however, intestinal parasites have been known to cause significant morbidity and mortality. The faecal-oral route is significant in the transmission of parasitic infections to humans via poor personal hygiene. By the time soil becomes contaminated with intestinal parasites, the eggs in the soil can be transferred onto vegetables, door handles, etc and onto the hands, through which it is then transferred to the mouth and finally down to the gut [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. Consequently, it is evident that the major health problems encountered in most qur'anic schools in the study area are rooted in Malams and their pupil's scepticism in orthodox medicine despite their access to health care facilities; even though their religion encourages personal hygiene and cleanliness as it is portrayed in their manner of prayers (Ablution).

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: ** The name, which is most famous in Northern Nigeria, was coined for the students of Qur'anic education, in view of their habitual emigration from their original hometowns to other places or to a popular teacher, settling in a different town for sound and pristine Qur'anic education. "*Almajiri*", is a general nomenclature given to both students and the destitute, but with different meanings attached to each. Whereas "*Student Almajiri*" is meant

exclusively for Qur'anic students; the "Destitute Almajiri" is mainly a habitual as well as perpetual beggar (whether child or adult). Ordinarily, the "Student Almajiri" is not meant to beg, but when pushed by the forces of livelihood - since he fends for himself, he alternatively resorts to begging for alms and food, though only at specified times (that is after school break or on school-free days), for sustenance. Unlike the "Destitute Almajiri" (beggar) who only stops begging when it is bedtime. (<http://www.gamji.com/articles8000/NEWS8006.htm>).

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 long dry season and short wet season. The climatic factors vary considerably over the year and are sharply inconsistent. The temperature out regime is warm to hot. The mean annual temperature is about 25°C but the mean monthly values range 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 commence in May, but early rains in April are most common. The bulk of the rainfall comes in June through September. Violent dust storms are usually accompanied by tornadoes and lightening, which usually precede the onset of the rains in May/June and their retreat in September or earlier than that [17]. Most of the state falls within the 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.

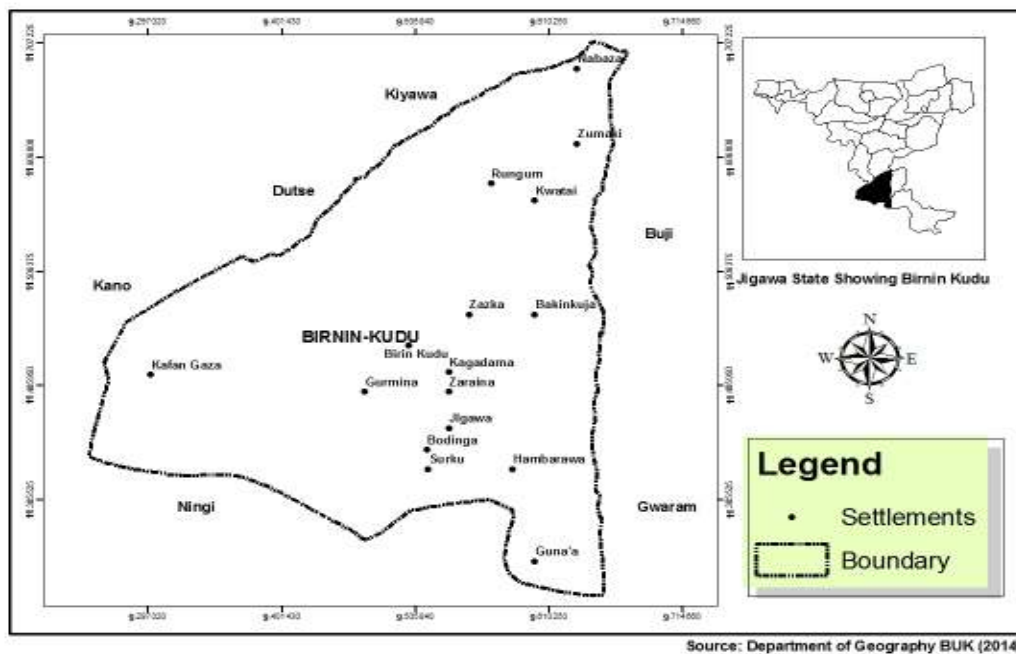


Fig 1. The Study Area.

2.2 Study Population

The study was exclusively conducted on Qur'anic School pupils (Almajiris) attending three different Qur'anic Schools in Birnin Kudu, Jigawa State (North-Western Nigeria). Simple random sampling procedure was used 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

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

2.4 Laboratory Analysis

A drop of mixture of the swabbed sample with normal saline was transferred using a sterile plastic Pasteur pipette to the centre of clean grease-free slide and carefully covered with a clean cover slip in order to avoid air bubbles and over floatation. Direct microscopic examination of the samples for ova of helminthes was carried out using X10 and X40 magnification 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 layer 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 magnification 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 using Chi square test. $P < 0.05$ was considered significant at 95% confidence interval. Data analysis was performed using statistical programme for social sciences (SPSS) version.

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 -value=1.00). 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 -value=.001) while qur'anic school "C" had the least overall prevalence of intestinal parasitic helminth infections as well as *Ascaris lumbricoides* infections of 48.8% and 12.5% respectively.

The age-related distribution of intestinal helminthes infections among the "Almajiris" in Birnin Kudu Local Government Area, Jigawa State is depicted in fig 2. The result showed that intestinal parasitic helminthes infection was at its peak (60.2%) within the age group of 11-15 years; whereas the age group of 26-30 years had the least (31.8%) and there was no significant difference between the prevalence of the infection in relation to age groups among pupils (P -value=1.00).

Table 1. Prevalence of Intestinal Helminthes among Almajiris in three Qur'anic Schools in Birnin Kudu Local Government Area, Jigawa State, Nigeria.

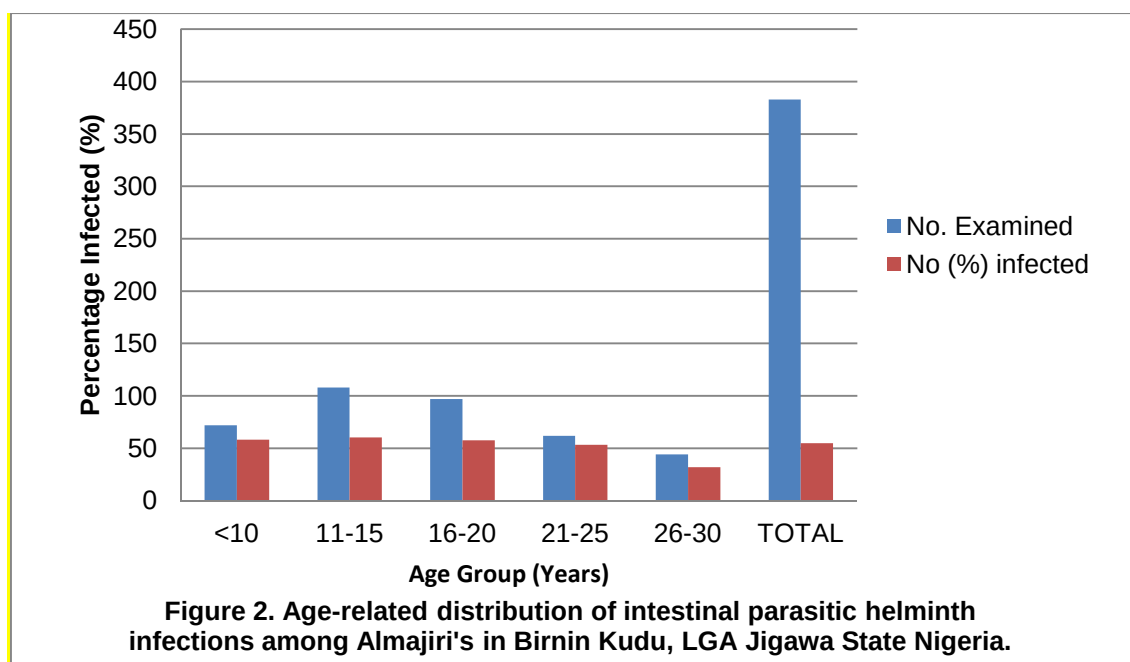
Parasite	No (%) Detected
<i>A. lumbricoides</i>	62 (29.5)
Hookworm	51 (24.3)
<i>E. vermicularis</i>	40 (19.0)
<i>Trichuris trichiura</i>	17 (8.1)
<i>A. lumbricoides</i> +Hookworm	14 (6.7)
<i>A. lumbricoides</i> + <i>E. vermicularis</i>	9 (4.2)
Hookworm+ <i>T. trichiura</i>	12 (5.7)
<i>A. lumbricoides</i> + <i>E. vermicularis</i> + <i>T. trichiura</i>	5 (2.3)
Total	210 (100)

N= 383

157 **Table 2: Distribution of Intestinal Parasitic Helminthes among “Almajiris” in three**
 158 **Qur’anic Schools in Birnin Kudu Local Government Area, Jigawa State,**
 159 **Nigeria.**
 160

Qur'anic School	No. Examined	No. infected (%)	A. <i>lumbricoides</i> No. (%)	Hookworm No. (%)	E. <i>vermicularis</i> No. (%)	T. <i>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)

161
 162 $\chi^2=26.950$, $P<.05$ (using Chi-square Test)
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 172 **Discussion**

173 Infections with helminth parasites present a major public health problem in poor and
 174 developing countries and have constituted global health as well as economic threat, which
 175 does not only depend on regional or ecological conditions, but also on the development of
 176 the people [19]. The biological control and prevention of intestinal infections, either by

177 parasites or bacteria, requires an in-depth comprehension and knowledge of the
178 epidemiological aspects of the problem, for guidance in the design of practical and economic
179 control and prevention measures. Prevalence of intestinal parasites is largely due to poor
180 personal hygiene and environmental sanitation, lack of potable water, poverty, ignorance of
181 health promotion practices and poor health services [20]. Most common intestinal parasitic
182 infections of man are faecal borne and their transmission occurs either directly from hand-to-
183 mouth or indirectly through food and water. The transmission of these parasites within the
184 community is directly related to human habits with regards to personal hygiene, feeding
185 habits, defaecation, cleanliness and level of education. Therefore, their prevalence in the
186 community can be used as an indicator of the living conditions and environmental sanitation
187 levels as well as the socioeconomic status of the community [20].

188 The present study revealed a high prevalence of intestinal helminth parasites (54.8%) and
189 this is the first report of its kind in this study area. The result of this research is similar to
190 those of [21-26] among others, as well as some parts of other countries such as Central
191 Jakarta [20], where there was high prevalence of intestinal helminth parasites amongst
192 school pupils in other part of the country. It is however in contrast to a lower prevalence of
193 21% found among school children in Baglung, Nepal [27].

194 The higher prevalence of *Ascaris lumbricoides* recorded in this study is in concordance with
195 previous reports of [8]; [26] and [28-31]. This could be attributed to its high survival strategies
196 which are conferred on it by the outer chitinous layer of the egg shell and the laying of
197 numerous eggs of about 2000 per day by the female worm. Moreover, it was observed that
198 the study area lacked environmental and personal hygiene as well as absence of modern
199 toilet facilities. Hence, this might have tremendously contributed to the high prevalence rate
200 of intestinal helminthes recorded in the area. It has been reported that lack of sanitary
201 facilities, particularly latrine, would greatly determine the presence of roundworm in any
202 given place [32]. In addition, it is a known fact that most "Almajiris" are in the habit of
203 defaecating in the surrounding bushes and mostly walking bare footed; hence brightening
204 the chances of contamination and infestation. Similarly, they are fond of picking up food
205 items from the ground where they are prone to be infested by soil transmitted helminthes.

206 The variations in the prevalence of the infection in different qur'anic schools studied could be
207 associated with various factors involving the "Almajiris" themselves as well as the schools
208 and its environment. It is a clear fact that the qur'anic schools studied, lack modern toilet
209 facilities and even where the toilets are available; they appeared to be unclean and
210 dilapidated as well as improper waste management system. Consequently, this necessitated
211 indiscriminate defaecation in adjacent bushes; thereby colossally contributing to the
212 prevalence of intestinal helminthes infection in the study area. Importantly, environmental
213 sanitation plays a pivotal role in the transmission of most intestinal parasites.

214 Though not significant, the proliferation and high rate of intestinal parasitic helminthes
215 infection observed within the age group 11-15 years could be attributable to the active nature
216 of the age range. In fact, children of this age bracket tend to be more exposed to
217 contaminated sites and eating food with unwashed hands whereas the older age group tend
218 to be more selective in their choice of food and outdoor activities thereby reducing infection
219 risks through good health habits.

220 The noticeable and relatively high prevalence of intestinal parasites in this study is an
221 indication of poor personal hygiene of the "Almajiris". It is understood that hand -to-mouth
222 helminthes transmission is the most effective means of transmission for most helminth
223 parasites and hence this proved the low level of education on personal and hand hygiene of
224 the pupils. Moreover, it was also observed that the parasite eggs were markedly lower
225 among "Almajiris" with trimmed fingers.

226 Despite their high prevalence in developing countries, persons with intestinal parasites have
227 very low morbidity and mortality rates, thus intestinal parasites are commonly viewed as low-
228 priority health problems. However, Ascariasis caused intestinal obstruction in 5-35% of
229 pediatric cases in a comparison of studies conducted throughout the tropics. The intestinal
230 obstruction by *Ascaris* worms is often fatal. In addition, hookworm infection can cause iron
231 deficiency anemia; and trichuriasis is associated with chronic dysentery and rectal prolapsed
232 [33, 34].

233 This study emphasizes the importance of teaching “Almajiris” and their teachers, otherwise
234 known as “Malams”, the habit of regular hand washing and personal hygiene as well as
235 instilling the habit of periodic deworming exercise in them. It would be pertinent that potable
236 water and efficient waste disposal facilities be provided in schools in most developing
237 countries, especially those in rural areas, where there are almost no existing ones. This
238 factors will tremendously mitigate the rate of transmission of these parasites to uninfected
239 children and prevent autoinfection.

240 **4. CONCLUSION**

241
242 The study revealed high prevalence of intestinal helminth parasites in the fingernails of
243 “Almajiris”; hence prompting proactive measures to avert the dastardly situation, which if
244 handled with laxity, may result in colossal health challenges to the community. Therefore,
245 the most effective means of preventing the transmission of these parasites include the
246 followings: provision of good toilet facilities and waste management system; integration of
247 deworming programmes into the existing health infrastructure; prompt treatment of infected
248 persons as well as proper education on the need for good personal hygiene and regular
249 hand washing habit.

250

251 **CONSENT**

252

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

255

256 **ETHICAL APPROVAL**

257

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

260

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